

The Team Role Test: Development and Validation of a Team Role Knowledge Situational Judgment Test

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The main objectives in this research were to introduce the concept of team role knowledge and to investigate its potential usefulness for team member selection. In Study 1, the authors developed a situational judgment test, called the Team Role Test, to measure knowledge of 10 roles relevant to the team context. The criterion-related validity of this measure was examined in 2 additional studies. In a sample of academic project teams ($N = 93$), team role knowledge predicted team member role performance ($r = .34$). Role knowledge also provided incremental validity beyond mental ability and the Big Five personality factors in the prediction of role performance. The results of Study 2 revealed that the predictive validity of role knowledge generalizes to team members in a work setting ($N = 82$, $r = .30$). The implications of the results for selection in team environments are discussed.

Keywords: group roles, team leadership, situational judgment test, group processes

The movement to team-based work designs in organizations has been substantial in recent years (Cohen, Ledford, & Spreitzer, 1996; Devine, Clayton, Philips, Dunford, & Melner, 1999; Lawler, Morhrman, & Ledford, 1992; Morgeson, Johnson, Campion, Medsker, & Mumford, 2006). This trend presents unique challenges to managers responsible for staffing teams with individuals who have the knowledge, skills, and abilities (KSAs) they need to work effectively in a team environment (Larson & LaFasto, 1989; Stevens & Campion, 1994). Traditional selection systems, which focus mainly on technically oriented KSAs, will likely be deficient in team environments, because such systems typically do not focus on the interpersonal skills needed in team environments (Morgeson, Reider, & Campion, 2005). What are needed are conceptual tools for understanding the unique contributions made by employees in a team environment and practical tools for assessing the characteristics of individuals that allow them to make those contributions.

One way to understand the contributions individuals make to teams is by considering the roles members play in executing critical team functions (Stewart, Fulmer, & Barrick, 2005; Stewart, Manz, & Sims, 1999). Roles are necessary for effective internal execution of the team's work, effective management of the team's relationship with its environment, and preservation of the team's vitality through meeting the social needs of its members (Hackman, 1987; McGrath, 1984; Sundstrom, De Meuse, & Futrell, 1990). A better understanding of the roles that facilitate the accomplishment of these critical functions and the knowledge that allows team members to assume these roles may help managers staff teams with members who will work well within an interdependent team environment.

In the present research, we focus on team roles and have two overarching goals. The first is to introduce the concept of team role knowledge and to discuss its potential utility for staffing work teams. The second goal is to develop and validate a situational judgment test designed to measure role knowledge. We believe the results of this research will contribute to the existing literature in at least three ways. First, although roles are considered a basic feature of work teams (Sundstrom et al., 1990) and an important part of an effective team (Ancona & Caldwell, 1988; Belbin, 1993), roles have received surprisingly little empirical attention in the teams literature. For the most part, the scant work that has been conducted has used ad hoc teams in laboratory settings. We address this gap by examining a recently developed typology of team member roles (Mumford, Campion, & Morgeson, 2006) using existing team members in multiple settings.

Second, we investigate whether knowledge of when a particular team role should be adopted is related to team member performance. Personality has been the predominant individual differences variable examined within the teams literature. This ap-

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proach, however, has yielded somewhat mixed results (Yeatts & Hyten, 1998), in part because personality traits are distal to team work requirements. Moreover, exclusive use of the Big Five personality factors may not fully capture the breadth of task and boundary spanning team roles (e.g., Ancona & Caldwell, 1988; Gladstein, 1984; Van Vianen & De Dreu, 2001). For example, both agreeableness and extraversion are socially oriented traits, and conscientiousness is the only trait that would seem to be relevant to task role performance in almost all teams. We believe that role knowledge is more proximal to team member performance than is personality and that the competence to assess team situations and determine which role is required is critical, because it allows team members to be flexible and to assume different roles depending upon the situation. Unfortunately, we are not aware of any studies that have examined the influence of role knowledge on performance in a team environment.

Third, prior research has focused almost exclusively on the creation of descriptive typologies of roles and has paid much less attention to applying this knowledge to address issues facing human resources practitioners. The results of the present study contribute to practice by describing the development and validation of an instrument that staffing professionals can use to select employees in team environments.

We begin by defining team roles and discussing why thinking about teams in terms of roles is advantageous. We then review existing conceptualizations of functional roles relevant to the team context. Next, we describe the development of a situational judgment test of team role knowledge—the Team Role Test—for use in team member selection. Last, we report the results of two studies in which we investigated the criterion-related validity of this measure.

Concept of Team Roles

One way to conceptualize the behavior of team members is to consider the different roles individuals assume when interacting as a team. A role is generally defined as a cluster of related and goal-directed behaviors characteristic of a person within a specific situation (Stewart et al., 1999, 2005) and is considered to be one of the fundamental and defining features of teams in particular (Hackman, 1990) and of organizations more generally (Katz & Kahn, 1978). Fulfillment and coordination of team roles are thought to be necessary so the team can perform effectively and so it can avoid process losses associated with dysfunctional conflict, role ambiguity, and social loafing (Steiner, 1972).

The use of the role construct provides several advantages for understanding how individuals contribute to the team. For one, the concept of roles from dramaturgical theory (Hare & Blumberg, 1988) provides a useful metaphor for how individuals contribute to teams. Because the term *role* is linked to the parts played by actors, the word carries with it the notion of the individual playing a part within a larger drama and captures the “embeddedness” notion that is viewed as essential for understanding individuals in teams (Sundstrom et al., 1990).

Furthermore, the concept of a role is more dynamic and flexible than is the concept of jobs. Much has been written about the changing nature of the way work is structured within organizations (e.g., Ilgen & Pulakos, 1999). Strong bureaucracies are giving way to participative team structures (Barker, 1999); use of temporary

workers and independent contractors is changing the psychological contract with workers (Van Dyne & Ang, 1998); and rigid job structures are being replaced by the more fluid concept of work roles and competencies (Bridges, 1994; Lawler, 1994). As employees are formed into teams, their individual “jobs” often are very broadly defined. The concept of the role is valuable, because it allows us to define groups of activities in more flexible terms; thus, the concept is better suited for requirements posed in dynamic team environments.

Team Roles Literature

Several conceptualizations of team roles can be found in the research literature on organizational and social psychology. The earliest and perhaps most pervasive work was done by Benne and Sheats (1948). These researchers proposed a typology of 27 team member roles, which they grouped into three categories. Task roles are related to the task the team is undertaking, and they facilitate and coordinate team effort in selecting, defining, and solving common problems. Maintenance roles are oriented toward strengthening, regulating, and perpetuating the team as a team. Finally, individual roles are taken to satisfy individual needs that are irrelevant to the team’s task. Similarly, Bales and colleagues (Bales, 1950; Bales & Slater, 1955) attempted to categorize the various behaviors exhibited by individuals in small team settings. They identified 12 behavioral categories, 6 that reflected task-related activities (e.g., giving suggestions) and 6 that reflected socioemotional activities (e.g., showing agreement).

More recently, Belbin (1981, 1993) identified seven roles on the basis of research with executive management teams (e.g., Belbin, Aston, & Mottram, 1976). The roles were asking, informing, proposing, opposing, delegating, building, and commenting. Using data from leaders and members of project development teams, Ancona and Caldwell (1988, 1992) identified functional activities that teams engage in to manage their boundaries within the organization at large. Their research revealed four main factors, which the researchers labeled consul (buffering and representational activities), task coordinator (coordinating technical or design issues), scout (scanning for ideas and information), and guard (avoiding release of information).

Several practitioner-oriented team role typologies can be found in the literature. McCann and Margerison (1989, 1995) used interviews with teams to develop a model containing eight roles located on four dimensions, which the researchers called relationships (extroversion–introversion), information (practical–creative), decision making (analytical–beliefs), and organization (structured–flexible). Parker (1994, 1996) proposed a similar set of four team-player “styles” that represent preferences individuals have for interacting within the team context. These styles fall into four types: contributor, collaborator, communicator, and challenger.

D. Barry (1991) conducted qualitative research and identified four types of “distributed leadership” that self-managed teams require. These include envisioning leadership (creating new and compelling visions), organizing leadership (imposing order on the team’s task), spanning leadership (facilitating the activities that link the team with the organization), and social leadership (developing and maintaining the team socially and psychologically). Last, DuBrin (1995) described 10 “team-enhancing” roles: knowl-

edge contributor, process observer, collaborator, people supporter, challenger, listener, summarizer, conciliator, mediator, and gatekeeper. However, no validation evidence was provided in support of these roles.

Mumford et al. (2006) recently addressed the fragmentation in the team roles literature by integrating existing role typologies. Their review of the literature resulted in 120 team member roles. Using a Q-sort methodology, the researchers independently sorted these roles into categories that captured the essence of each role. This process revealed that the original 120 roles could be reliably sorted into 10 unique roles. Table 1 displays the names of these roles and their relationship with previous roles in the literature. In Table 2, we present definitions for the 10 new roles and a description of situations in which each role would be appropriate.

Mumford et al. (2006) also grouped the team roles into three broader categories of task, social, and boundary-spanning roles. Task roles share the common function of carrying out the work

that constitutes the team's objective. There are five task roles within this typology: Contractor, Creator, Contributor, Completer, and Critic. For example, the Contractor role serves to provide organization and structure to the team's task. Relevant behaviors include organizing and coordinating the actions of team members relative to the task (e.g., by suggesting task allocations, deadlines, and task sequencing) and clarifying team member abilities, resources, and responsibilities.

Social roles involve maintaining the social environment in which teams function. The three social roles in this typology are Communicator, Cooperator, and Calibrator. The Communicator role, for example, encompasses behaviors that create a social environment that is positive, open, and conducive to collaboration. Role behaviors include paying attention to the feelings of team members, listening to the opinions or contributions of others, and effectively communicating personal sentiments.

Last, boundary-spanning roles acknowledge important behaviors that team members exhibit outside of the team. This typology

Table 1
Roles From Previous Work That Served as the Basis for the Mumford et al. (2006) Team Role Typology

Mumford et al. (2006) typology	Previous study							
	Benne & Sheats (1948)	Bales (1950)	Belbin (1993)	Ancona & Caldwell (1992)	McCann & Margerison (1995)	Barry (1991)	DuBrin (1995)	Parker (1996)
Contractor	Coordinator Initiator-contributor Opinion seeker Information seeker Orientor Energizer	Gives orientation. Asks for orientation. Asks for opinion. Asks for suggestion.	Coordinator Shaper		Assessor Thruster	Organizing	Collaborator Summarizer	Collaborator
Creator			Planter		Creator	Envisioning		
Contributor	Opinion giver Information giver Elaborator	Gives opinion. Gives suggestion.	Specialist					
Completer	Procedural technician Recorder		Completer Implementer		Concluder Controller Reporter		Knowledge contributor	Contributor
Critic	Evaluator-critic	Disagrees. Shows tension. Shows antagonism.	Monitor evaluator				Challenger	Challenger
Cooperator	Follower Compromiser							
Communicator	Encourager	Shows solidarity. Tension release. Agrees.	Teamworker		Upholder	Social	People supporter Listener	
Calibrator	Harmonizer Gatekeeper Group observer Standard setter						Process observer Conciliator Gatekeeper	Communicator
Consul				Ambassador Guard				
Coordinator			Resource investigator	Task coordinator Scout	Explorer	Spanning		

Note. From "Situational Judgment in Work Teams: A Team Role Typology," by T. V. Mumford, M. A. Campion, and F. P. Morgeson, in *Situational Judgment Tests: Theory, Measurement, and Application* (pp. 324–325), edited by J. A. Weekley and R. E. Ployhart, 2006, Mahwah, New Jersey: Erlbaum. Copyright 2006 by Lawrence Erlbaum Associates, Publishers. Adapted by permission.

includes two boundary-spanning roles: Coordinator and Consul. The Consul role, for instance, functions to present the team's goals and interests in a favorable light and to influence constituent perceptions of the likelihood of team success. This role often involves interacting with organizational leaders to procure resources for the team.

Team Role Knowledge

Although researchers have devoted considerable thought to the various roles team members might assume, much less attention has been devoted to individual differences relevant to the performance of those roles. One particularly important individual difference is knowledge of team roles and the situations in which different roles are needed. We define *team role knowledge* as the knowledge an individual possesses about the nature of team roles and the situational contingencies governing their use. The term encompasses the declarative and procedural knowledge of role types and contingencies that is needed to effectively perform team roles.

One of the main ways in which team role knowledge is likely to influence role performance is by increasing the "role repertoires" of team members. A role repertoire represents the sum total of role behaviors a person is able to display (Cameron, 1950; Sarbin & Allen, 1968). Having a broad role repertoire, in turn, allows team members to adapt their roles in response-changing situations (Ginnett, 1990; McIntyre & Salas, 1995; Parker, 1996). For example, in a cross-functional team, a member from the department responsible for design may assume the role of Coordinator as the team is developing the product. However, as product development progresses, this member may take on another, more relevant role, such as Critic, to challenge assumptions and encourage critical evaluation of team decisions.

Role adaptability is particularly important in situations where environmental and social cues are relatively ambiguous. When members are working in a team, the work is assigned to the team as a whole, often without clear delineation as to who should perform each task. This situation creates ambiguity around what each team member is supposed to do. Additionally, in contrast to a traditional hierarchical system, in which each employee reports to a single supervisor, in a team environment, every team member usually is given some responsibility. This system can create uncertainty as to expectations, introduce a greater possibility of role conflict, and increase the probability that team members will need to perform multiple roles to accommodate these expectations.

Summary

Recent research has identified 10 main functional roles relevant to the team environment (Mumford et al., 2006). We suggest that knowledge concerning team roles and the situations governing their use is critical to being an effective team member. Unfortunately, previous research has neglected team role knowledge as a potentially important individual difference variable. As a result, practitioners have not considered role knowledge as a possible predictor for selection in team environments.

We address this gap in the current study by developing and validating a situational judgment test (SJT) designed to measure team role knowledge. As with selection procedures, such as biodata inventories, structured interviews, and assessment center ex-

ercises, SJTs are best thought of as a method (rather than a specific construct) that can be used to assess a wide range of predictor constructs (Arthur & Villado, in press; Schmitt & Chan, 2006). Furthermore, situational tests are thought to capture declarative and procedural knowledge relevant to the target construct or constructs (Motowidlo, Hanson, & Crafts, 1997; Ployhart & Ehrhart, 2003; Weekley & Jones, 1999). Given these findings, a SJT would seem to provide a useful method for assessing one's knowledge concerning the variety of roles that individuals can choose in a team situation.

Moreover, there is evidence that the constructs SJTs assess are valid predictors of job performance (McDaniel, Morgeson, Finnegan, Campion, & Braverman, 2001) and that they tend to produce smaller ethnic group differences (Weekley & Jones, 1999) and more favorable applicant reactions (Bauer & Truxillo, 2006) than do cognitive ability tests. Although prior research has demonstrated the validity of KSA-based situational tests in team environments (Morgeson et al., 2005; Stevens & Campion, 1994), the present study is the first we know of that used a situational approach to measure team role knowledge.

We begin by describing the results of a pilot study conducted to develop and evaluate the psychometric characteristics of the initial role knowledge measure. Next, we examine the criterion-related and incremental validity of a refined measure for predicting team member role performance in a sample of academic project teams. Then we discuss the final study, in which we collected validation evidence using production teams in a work setting.

Study 1: Measure Development and Pilot Test

Method

Participants

We administered the Team Role Test (TRT) to 160 advanced undergraduate students enrolled in a human resources management course at a large midwestern university. Participants were 58% male and were on average 21.9 years old ($SD = 1.97$). Participation in this research was optional, voluntary, and anonymous. The students completed the TRT during a regularly scheduled class session, and they received course extra credit for their participation.

Measure Development

The TRT was designed to measure knowledge of team roles and the contingencies surrounding their appropriate use in team situations. Creating the TRT was an iterative process, and we followed current recommended practices for SJT development (e.g., Weekley, Ployhart, & Holtz, 2006). We began by reviewing the definitions and situational contingencies of each role in the Mumford et al. (2006) team role typology (see Table 2). We then wrote one scenario relevant to each role. The scenarios depicted a variety of organizational contexts, including several manufacturing-oriented teams, an airline maintenance team, an insurance sales team, and a nonprofit management team. Each scenario described a situation likely to be encountered in a team environment and was designed to require one, and only one, appropriate role. That is, one role was intended to be more correct than the others for the given scenario.

Table 2
Team Role Definitions and Contingencies From the Mumford et al. (2006) Team Role Typology

Role	Definition	Conditions in which role is appropriate
Contractor	Behaviors that function to structure the task-oriented behaviors of other team members. The Contractor organizes and coordinates the actions of team members relative to the task by suggesting task allocations, deadlines, task sequencing, and follow-ups and by motivating members to achieve team goals. The Contractor summarizes the team's task accomplishments to date and assures that team meeting time is spent efficiently by focusing on task issues.	<i>Work ambiguity</i> : Uncertainty surrounding the work to be accomplished or the strategy for accomplishing it. Occurs when task demands are technically complex (Herold, 1978, 1980); team members have little task experience (Vecchio, 1987); team members have little experience working together (Bettenhausen & Murnighan, 1985; Ginnett, 1990).
Creator	Behaviors that function to change or give original structure to the task processes and strategies of the team. The Creator provides new, innovative, or compelling visions of the team objective and approaches to the task or strategies for accomplishing the task. These behaviors may involve a "reframing" of the team's objective and the means that should be used to accomplish it; looking at the big picture; and providing creative solutions to the task's problems.	<i>Creative and strategic stagnation</i> : The team needs creativity in terms of task strategy or task ideas and solutions. Occurs when team is new and members have little task experience (Gersick & Hackman, 1990); work is predominantly "creative" in nature (Hackman & Morris, 1975; McGrath, 1984); team's purpose is unclear, or current strategy is failing (Gersick, 1988, 1989); team is in its initial meeting or at its developmental midpoint transition (Gersick, 1988, 1989; Hackman & Walton, 1986).
Contributor	Behaviors that function to contribute critical information or expertise to the team. They include being assertive when dealing with areas that are within the domain of the team member's expertise and sharing critical knowledge within the team, and they may involve enough self-promotion to convey the Contributor's credentials to the team. The Contributor clarifies team member abilities, resources, and responsibilities and trains individual team members, as well as the team in general.	<i>Distributed expertise</i> : Represents situations in which task-required resources are heterogeneously distributed among the members. Occurs when work is predominantly "choice" oriented (McGrath, 1984); team members have little experience working together (Ginnett, 1990); high status differentials exist (Ginnett, 1990; McIntyre & Salas, 1995); task resources are heterogeneously distributed among team members (Libby et al., 1987).
Completer	Behaviors that function to execute the individual-oriented tasks within the team. The Completer role may involve "doing homework" to prepare for team meetings, volunteering to take personal responsibility to complete certain tasks within the team, assisting team members with completing their tasks, and following through on commitments made within the team.	<i>Individual-oriented work</i> : Represents the situations in which team effectiveness depends upon the performance of behaviors by individuals working alone outside the team environment. Occurs when work is predominantly "execution" oriented (Larson & LaFasto, 1989; McGrath, 1984); there are individual-oriented and unitary tasks that must be completed (Steiner, 1972); team is at its second developmental phase (Gersick, 1988, 1989; Hackman & Walton, 1986).
Critic	Behaviors related to going against the "flow" of the team. They function to subject the ideas or decisions of the team to critical evaluation and scrutiny. The Critic questions the purpose or actions of the team or ideas proposed within the team, even if a formal "leader" has sponsored an idea. The Critic insists on evaluating "worst case scenarios," points out flaws or assumptions the team is making, and must be willing to present negative information to the team.	<i>Unscrutinized concurrence</i> : Represents situations in which the team is approaching consensus on a task without adequate analysis of positive and negative contingencies. Occurs when team is prematurely seeking concurrence (Lawrence & Lorsch, 1969); there is a high level of trust among team members (McIntyre & Salas, 1995); work is predominantly a "decision-making dilemma" (Katz & Kahn, 1978); task demands are technically and/or socially complex (Herold, 1978, 1980; Longley & Pruitt, 1980); team is highly cohesive, is insulated, and has directive leadership in a stressful environment (Janis, 1972).
Cooperator	Behaviors that function to conform to the expectations, assignments, and influence attempts of other team members, the team in general, or constituents to the team. This should be a proactive role, where there is critical inquiry into the decision and provision of input; the Cooperator must also support the team's decision, once made, which allows the team to move forward. The Cooperator role involves acknowledging the expertise of others and supporting their direction.	<i>Scrutinized concurrence</i> : Represents situations in which the team has critically evaluated and clearly established the merits of a particular decision. Occurs when team has had adequate differentiation before seeking concurrence (Lawrence & Lorsch, 1969); work is predominantly "negotiation" oriented (McGrath, 1984); distributed expertise and high status differentials exist (Ginnett, 1990; Libby et al., 1987; McIntyre & Salas, 1995).
Communicator	Behaviors that function to create a social environment that is conducive to collaboration. They include paying attention to the feelings of team members, listening to the opinions and contributions of others, communicating effectively, and injecting humor into tense situations. The Communicator role does not deal with direct "influence attempts," as does the Calibrator.	<i>Social sensitivity</i> : Represents situations in which team effectiveness is elastic with regard to social processes. Occurs when work is predominantly "negotiation" oriented (McGrath, 1984); task demands are socially complex (Herold, 1978, 1980); team context is emotionally demanding or stressful (McIntyre & Salas, 1995; Morgan & Bowers, 1995); team is diverse in terms of values and attitudes (Jackson et al., 1995).

Table 2 (continued)

Role	Definition	Conditions in which role is appropriate
Calibrator	Behaviors that function to observe the team social processes, to make the team aware of them, and to suggest changes to these processes that would bring them in line with functional social norms. The Calibrator role involves overt creation of new team norms dealing with team process issues (not task issues). It may involve initiating discussion of power struggles or tensions in the team, settling disputes among team members, summarizing team feeling, and soliciting feedback.	<i>Nonfunctional team processes:</i> Represent situations in which functional patterns of social interaction have not been established in the team, or they have been disrupted by malfunctioning behavior. Occurs when team is new and team members have little experience working together, or there are changes in team composition (Ginnett, 1990; Kozlowski et al., 1996); there is emotional or task-based conflict or distrust in the team (Jehn, 1995, 1997); work is "negotiation" oriented, and the context is socially demanding (Herold, 1978, 1980; McGrath, 1984).
Consul	Behaviors that involve interactions taking place primarily outside the team setting that function to collect information and resources from relevant parties in the organization. The Consul role involves presenting the team, its goals, and its interests in a favorable light and influencing constituent perceptions of the likelihood of team success; it requires a willingness to provide resources.	<i>External resource dependence:</i> Represents situations in which the existence and effectiveness of the team are dependent upon support and resources from its environment. Occurs when team does not possess the needed information, money, and personnel (Hackman & Walton, 1986); team is new and somewhat experimental, and constituents need status updates (Ancona, 1990; Klimoski & Jones, 1995).
Coordinator	Behaviors that involve interactions taking place primarily outside the team setting. The Coordinator interfaces with constituents and coordinates team efforts with other parties. The role also involves soliciting timely feedback on the team's performance.	<i>External activity interdependence:</i> Represents situations in which the activities of the team must be coordinated with the activities of teams, customers, and individuals outside the team. Occurs when activities of the team are interdependent with activities of other teams (Ancona, 1990; Green et al., 2000); activities of the team are interdependent with activities of customers or suppliers (Ancona, 1990; D. Barry, 1991).

Note. From "Situational Judgment in Work Teams: A Team Role Typology," by T. V. Mumford, M. A. Campion, and F. P. Morgeson, in *Situational Judgment Tests: Theory, Measurement, and Application* (pp. 326–330), edited by J. A. Weekley and R. E. Ployhart, 2006, Mahwah, New Jersey: Erlbaum. Copyright 2006 by Lawrence Erlbaum Associates, Publishers. Adapted by permission.

We then generated 6–12 alternative ways to respond to each scenario. Specifically, we reviewed the conditions associated with each role (shown in the last column of Table 2) and wrote questions relevant to the conditions. The correct answers for each scenario were behaviors consistent with the targeted role, and the incorrect answers were behaviors inconsistent with the role. To avoid creating an ipsative measure (because such measures are not ideal for making the between-person comparisons required for personnel selection), we made the role-inconsistent responses less effective than rather than representative of other roles in the typology.

An example TRT scenario and condensed set of response options is presented in Appendix A. This scenario is consistent with the situational contingencies for the Calibrator role, in that there are recent changes to the team composition (new team members), there is emotional conflict within the team, and the context is socially demanding (stress from poor performance). Also note that the two effective responses describe behavior consistent with the Calibrator role, whereas the less effective responses describe behavior inconsistent with this role (i.e., because they involve taking sides in the conflict and do not attempt to structure the team's norms).

Respondents rated the effectiveness of each action on a 5-point Likert-type scale, whereby 1 = a very ineffective way to handle the situation and 5 = a very effective way to handle the situation. Thus, each respondent made 6–12 ratings per scenario. To derive scores for knowledge of a particular role, we first reverse coded respondents' ratings of actions that reflected role-inconsistent behaviors

(which should receive low effectiveness ratings). For instance, we recoded ratings of 1 to yield a high score of 5. Then, we computed the mean effectiveness rating across all the items for that role scenario, such that higher means indicated higher role knowledge (i.e., we rated role-consistent behaviors as effective and role-inconsistent behaviors as ineffective).

Results

We began by reviewing the results for each TRT role scenario to see whether information should be added, revised, or deleted. We found the Cooperator role scenario to be problematic. For example, scores on this role scenario had zero or negative correlations with the other social role scenarios. Although we modified the scenario and several of the items, we observed very similar issues in Studies 2 and 3. As a result, we excluded this role from further analyses.

We also investigated the alternatives for each scenario. For example, we closely inspected alternatives with low item–scale correlations, as well as those with low standard deviations. In many instances, we revised or eliminated the alternative and developed a new one. In developing new alternatives, we paid particular attention to the role definitions and to the nature of the alternatives that showed higher interitem correlations. As an example, less effective alternatives were created to be more clearly demonstrative of behavior inconsistent with the target role.

Next, we used the data to help determine the most appropriate way to score the TRT. Developing scales for knowledge-oriented

measures is different from developing scales for inventories and questionnaires (Downing & Haladyna, 2006). For example, knowledge test items are objectively scored, such that responses are either correct or incorrect. Given this fact, the resulting scales tend to have lower interitem correlations (and thus lower internal consistency reliability) than do questionnaire scales, which tend to comprise a relatively large number of continuously scored items. This is one reason why knowledge tests do not tend to have a large number of subscales and, in fact, often have only an overall score representing knowledge across the domain of interest. Many SJT researchers have adopted this approach to test development. For instance, researchers tend to use objective scoring algorithms (e.g., by using subject matter expert ratings as criteria) and to create overall test scores rather than dimension-level scores (Lievens & Sackett, 2006; McDaniel et al., 2001; Weekley et al., 2006).

Consistent with this approach, we created TRT subscores representing task, social, and boundary-spanning role knowledge by averaging the scores on the individual roles that constitute each category. We also created an overall TRT score by averaging the three subscores. To estimate the internal consistency reliability of these scores, we used Mosier's (1943) formula for computing the reliability of weighted composites. Using this approach, we based reliability estimates for role-category-level scores on the reliability of the role-level scores that make up each category (as well as their variances, standard deviations, and intercorrelations). Similarly, the reliability estimate of overall TRT scores was based on the reliability of the three role category scores that make up the overall TRT score. The resulting reliability estimates for the role-category-level subscores were .78, .65, and .57, respectively, and the estimated reliability for overall TRT scores was .83.

Finally, we computed subgroup effect sizes for TRT scores with regard to gender (we did not estimate effects for ethnicity and age, due to the homogeneity of these characteristics across participants). Results revealed that women scored significantly higher ($p < .01$) than did men on all TRT scores. The d statistics for task, social, and boundary-spanning role knowledge scores were -0.43 , -0.50 , and -0.42 , respectively. The d for overall TRT scores was -0.53 .

Discussion

The results of Study 1 provide optimism regarding use of the TRT for assessment. For example, analysis of the pilot test data suggested the existence of individual differences in team role knowledge, which are essential for using the TRT for selection. Although the estimates of internal consistency reliability for the social and boundary-spanning roles subscores were lower than we would have liked, overall, the reliability of the TRT subscores and of the overall score was very much in line with the reliability of other SJTs reported in the literature (e.g., McDaniel et al., 2001).

We discovered that female participants tended to score about half a standard deviation higher than did male participants. The finding of higher scores for female respondents is consistent with the results of other SJT studies that have reported gender subgroup effects (e.g., Lievens & Coetsier, 2002; Weekley & Jones, 1999). One possible contributing factor is that the tests in these studies were designed to measure judgment in situations involving interpersonal interactions, such as doctor-patient and employee-customer interactions. Similarly, all of the TRT situations describe

some type of interaction with fellow team members. Thus, these findings appear to be consistent with research showing that women tend to have higher levels of interpersonal attributes, such as agreeableness (e.g., Hough, Oswald, & Ployhart, 2001), than do men.

Study 2: Validation of TRT in an Academic Setting

In this study, we investigated use of the TRT in academic project teams (a different sample from that of Study 1). Our primary goals were (a) to examine the psychometric characteristics of the TRT, as revised on the basis of the pilot test results; (b) to estimate the criterion-related validity of the revised TRT in relation to team member role performance; and (c) to investigate the incremental validity of the TRT beyond measures of constructs previous research has examined for team member selection, namely, mental ability and personality. The hypotheses that guided this study are described below.

Criterion-Related Validity of Team Role Knowledge

Theoretical models of job performance (e.g., Campbell, McCloy, Oppler, & Sager, 1993) have suggested that job knowledge is one of the primary determinants of performance, and there is strong empirical evidence to support this proposition (e.g., Dye, Reck, & McDaniel, 1993; McCloy, Campbell, & Cudeck, 1994; Schmidt & Hunter, 1998; Schmidt, Hunter, & Outerbridge, 1986). We designed the TRT to measure declarative and procedural knowledge relevant to team role behaviors. According to Campbell (1990), procedural knowledge and skill are attained when knowing what to do (i.e., declarative knowledge) is combined with knowing how to do it.

Accordingly, the TRT assesses respondent knowledge about the nature of team roles and associated situational contingencies and, more important, respondent knowledge of how to use that knowledge in situations that require a particular role. In turn, team members who have higher levels of role knowledge will be in a better position to respond effectively to team situations than will members who have lower levels of role knowledge. We also suggest that role knowledge is a necessary precursor of role flexibility. That is, members who are able to perceive changes in role requirements and to adapt their role to those requirements are likely to be more effective members. Taking these facts together, we hypothesized the following:

Hypothesis 1: Team role knowledge would be positively related to team role performance.

Incremental Validity of Team Role Knowledge

One of our primary objectives in this research was to develop a measure of team role knowledge that could be used to facilitate selection decisions in a team context. It was therefore important for us to investigate the predictive validity of the TRT relative to that of other commonly used predictors. The first alternative predictor we examined was a test of mental ability. Examining the incremental validity of role knowledge in relation to mental ability was important for several reasons. For one, mental ability tests are widely considered one of the most valid and efficient methods for employee selection (Schmidt & Hunter, 1998). Thus, it was es-

sential for us to demonstrate that additional predictors explain variance in performance beyond that explained by ability. Second, a previously developed teamwork SJT (Stevens & Campion, 1999) has been criticized because, although the predictor measure was designed to assess primarily noncognitive attributes (i.e., interpersonal and self-management skills), scores were highly related to mental ability. We felt it was important to show that a SJT designed to measure team role knowledge would be sufficiently independent from mental ability.

Job performance models (e.g., Campbell et al., 1993) have suggested that knowledge is more proximal to performance than is mental ability. For instance, studies have shown that job knowledge mediates the relationship between mental ability and performance (e.g., Hunter, 1983; Schmidt et al., 1986). Likewise, we suggest, team member role knowledge is more proximal to and more closely aligned with role performance than is mental ability. These facts led to our second hypothesis:

Hypothesis 2: Team role knowledge would provide incremental prediction of team role performance beyond that predicted by mental ability.

The second set of alternative predictors we examined was the Big Five personality factors. Research on the influence of personality factors in teams has increased greatly in recent years (e.g., Barrick & Mount, 1993; Barrick, Stewart, Neubert, & Mount, 1998; B. Barry & Stewart, 1997; Janz, Colquitt, & Noe, 1997; Morgeson et al., 2005; Neuman & Wright, 1999). According to Stewart et al. (2005), "Personality traits differ from roles in that they represent actions across multiple settings, whereas roles operate in a specific context and represent actions that are influenced by other people and the demands of a particular setting" (p. 345). In support of this difference, Stewart et al. found relatively small correlations between the Big Five factors and the extent to which team members took on task and social roles. Similarly, Morgeson et al. (2005) discovered virtually no relationship between the Big Five and a SJT designed to measure teamwork-related KSAs.

We believed that relations between personality and team role knowledge would be similarly modest. Additionally, knowledge is more proximal to performance than are personality traits (Borman, White, Pulakos, & Oppler, 1991; Campbell et al., 1993; Motowidlo, Borman, & Schmit, 1997), and, conceptually, role knowledge is more aligned with role performance than is personality. Taken these facts as a whole, we believed that team member role knowledge would be likely to explain variance in role performance beyond that accounted for by the Big Five.

Hypothesis 3: Team role knowledge would provide incremental prediction of team role performance beyond that provided by the Big Five personality factors.

Method

Participants

Participants for this study were 93 undergraduate students enrolled in an advanced human resources management course. The students were members of teams responsible for completing several projects, such as the development and presentation of a management skills training exercise. Teams comprised an average of

4.53 members ($SD = 0.77$), who were 52% female and were primarily (79%) between 21 and 30 years of age. Participation in the study was voluntary, and the students received extra credit for their involvement.

Measures

Team role knowledge. We measured role knowledge with a revised version of the TRT used in Study 1. The measure comprised nine scenarios (one for each role) and 10 items per scenario, for a total of 90 items. Of the 10 items for each scenario, 5 reflected effective performance for the particular role and 5 reflected less effective approaches. The rating scale and scoring algorithm were identical to those we described in the first study. As before, we created role-category-level variables by averaging the scores across the roles within each category. Internal consistency reliability estimates for the task, social, and boundary-spanning roles composites were .82, .74, and .59, respectively. We also created an overall role knowledge variable by averaging the scores across all nine scenarios ($\alpha = .85$).

Team role performance. We measured the performance of individual team members using a 27-item measure that comprised critical performance-related behaviors related to each role in a team. Each participant was rated by between one and five team members, with an average of 2.30 raters per participant ($SD = 1.37$). A brief description of each role was provided, along with 3 items that described behaviors characteristic of the role. Team members rated the frequency with which the ratee carried out the role behaviors using a Likert-type scale with anchors that ranged from *no extent* (1) to *a very great extent* (5). A sample set of role performance items is provided in Appendix B.

As with the TRT, we created role-category-level performance variables by averaging the relevant role-level ratings. Then, using data from the 59 participants whose role performance was rated by at least two peers, we estimated the interrater reliability of the ratings. The intraclass correlation coefficients (Bliese, 1998) for the task, social, and boundary-spanning roles composites were .55, .22, and .50. The interrater estimates for task and boundary-spanning roles were modest, yet typical for ratings criteria (e.g., Viswesvaran, Ones, & Schmidt, 1996), whereas the estimate for social role performance was much lower than we would have expected.

These modest reliability estimates may have been due, at least in part, to the relatively small amount of between-ratee variance (LeBreton, Burgess, Kaiser, Atchley, & James, 2003). Thus, we estimated the level of interrater agreement for the role performance ratings by computing $r_{\text{within-group}}$ (r_{wg}) coefficients using a negatively skewed null distribution (James, Demaree, & Wolf, 1984). The resulting interrater estimates were .92, .87, and .77, respectively. We also created an overall role performance variable, for which the r_{wg} was .94.

Mental ability. We measured the mental ability of team members using the Wonderlic Personnel Test (Wonderlic, 1999). The WPT contains 50 items involving word comparison, disarranging sentences, sentence parallelism, number comparison, number series, analysis of geometric figures, and word problems requiring mathematical or logical solution. Respondents are given 12 min to complete as many items as they can. Substantial evidence exists for the reliability and construct validity of WPT scores (Wonderlic,

2000). The internal consistency reliability of the WPT in the current study was estimated to be .89.

Personality. We measured the Big Five personality factors using the 50-item International Personality Item Pool (IPIP) instrument (Goldberg, 1999). Each IPIP scale comprises 10 items. For each item, respondents indicate the extent to which the statement is a *very inaccurate* (1) to a *very accurate* (5) description of who they are. Recent studies have demonstrated the reliability and construct validity of the IPIP scales (e.g., Goldberg et al., 2006). In the present study, coefficient alphas for the five personality scales ranged from .73 for openness to experience to .91 for extraversion.

Procedure

Participants completed the above measures on one occasion in a campus computer lab in groups of 5–12 individuals. After we welcomed participants to the session, they completed informed consent forms and were given an overview of the purpose of the study and the nature of the measures. Participants completed the measures in the following order: the TRT, the IPIP, the team role performance measure, and the WPT.

Results

Table 3 displays descriptive statistics, reliability estimates, and intercorrelations. We begin by briefly noting the significant relationships that emerged between role knowledge and the alternative predictors. Specifically, mental ability was positively related to task, social, and role knowledge scores, albeit at much lower levels than in previous teams SJT research (i.e., $r = .15-.28$ in the present study versus .81 in Stevens and Campion, 1999). However, the range of Wonderlic scores in this sample was somewhat restricted relative to that in the population of working adults ($SD = 5.37$ vs. 7.60 ; Wonderlic, 1999). Thus, we corrected the correlation between Wonderlic scores and overall TRT scores for indirect

range restriction using the procedure outlined by Hunter, Schmidt, and Le (2006). Accounting for the restriction in range increased the mental ability–TRT correlation from .28 to .39. Finally, of the personality variables, only agreeableness was significantly related to the TRT, correlating positively with both task and social role scores ($r_s = .20$ and $.22$, respectively).

We also examined whether mean TRT scores differed by gender. Consistent with the Study 1 results, women tended to obtain higher scores than did men ($d = -0.18$ to -0.55). Women’s scores were significantly higher than were men’s scores on both task role knowledge ($d = -0.55, p < .01$) and overall role knowledge scores ($d = -.50, p < .05$).

Hypothesis Testing

Our first hypothesis concerned the criterion-related validity of role knowledge in relation to team member role performance. The results presented in Table 3 provide evidence for the validity of the TRT. Task, social, and overall TRT scores were positively related to task, social, and overall role performance ratings. In addition, TRT boundary-spanning role scores correlated positively with task and overall role performance. TRT task role scores were the single best predictor of overall role performance ($r = .39$). These results provide strong support for Hypothesis 1.

Hypotheses 2 and 3 concerned the incremental validity of role knowledge beyond the alternative predictors of mental ability and personality. We used hierarchical multiple regression analysis to assess incremental validity in relation to task, social, and overall role performance. We did not examine boundary-spanning role performance, because there were no statistically significant bivariate predictors of this criterion. We evaluated two sets of prediction models (separately for cognitive ability and for the Big Five factors). In the first set, we regressed each role performance variable on the alternative predictor or predictors in the first step

Table 3
Descriptive Statistics, Reliability Estimates, and Intercorrelations for Study 2 Variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TRT scales																
1. Task roles	3.72	0.28	(.82)													
2. Social roles	3.67	0.30	.38**	(.74)												
3. Spanning roles	3.54	0.23	.52**	.22*	(.59)											
4. Overall	3.68	0.22	.91**	.64**	.60**	(.85)										
Alternative predictors																
5. Mental ability	26.32	5.37	.28**	.18*	.15	.28**	(.89)									
6. Agreeableness	4.15	0.58	.20*	.22**	.02	.16	-.12	(.84)								
7. Conscientiousness	3.73	0.75	.13	-.08	.08	.08	.01	-.13	(.83)							
8. Emotional stability	3.30	0.80	-.13	-.06	.12	-.10	.09	.08	.19*	(.88)						
9. Extraversion	3.41	0.87	.10	.02	.01	.10	-.09	.23*	.28**	.17	(.92)					
10. Openness	3.63	0.59	.10	.10	.11	.16	.15	.06	.01	.02	.34**	(.79)				
Team role performance																
11. Task roles	3.56	0.54	.44**	.23*	.27**	.39**	.08	.08	.11	-.21*	.16	-.07	(.92)			
12. Social roles	3.54	0.48	.28**	.28**	.17	.27**	.01	.32**	.02	-.10	.14	-.05	.61**	(.87)		
13. Spanning roles	3.12	0.60	.12	.02	.11	.07	.10	-.06	.04	-.08	.10	-.01	.54**	.48**	(.77)	
14. Overall	3.49	0.44	.39**	.22*	.25*	.34**	.06	.12	.09	-.19*	.18	-.05	.93**	.79**	.74**	(.94)

Note. $N_s = 93$ and 81 for predictor and criterion variables, respectively. TRT = Team Role Test; Spanning = boundary spanning; Openness = openness to experience. Reliability estimates are along the diagonal in parentheses. Coefficient alphas are shown for the predictors, and $r_{within-group}$ coefficients are shown for the criteria.
* $p < .05$, one-tailed. ** $p < .01$, one-tailed.

and added the three TRT subscores in the second step. In the second set of models, we regressed the role performance variables on the alternative predictor or predictors in the first step and added overall TRT scores in the second step.

Results indicated that the TRT provided a statistically significant level of incremental validity when added to a model that included mental ability, as well as when added to a model that included the Big Five factors. For parsimony, as well as to assess the overall incremental validity of the TRT, we then evaluated the change in variance accounted for beyond both sets of alternative predictors simultaneously. These results are shown in Table 4.

Beginning with the alternative predictors, mental ability was largely unrelated to role performance, and correcting the ability–role performance correlations for indirect range restriction (on the Wonderlic scores) had only a trivial effect on the resulting validity estimates. For example, the correlation between mental ability and overall role performance ratings composite increased from .06 to .09 after we had accounted for restriction of range. In contrast, several of the Big Five factors were significant predictors of role performance. Agreeableness predicted social role performance of team members, and emotional stability and extraversion predicted task and overall role performance.

Despite this, TRT scores provided incremental validity beyond mental ability and personality. The TRT subscores provided incremental validity in the prediction of task and overall role performance ($\Delta R^2 = .15$ and $.11$, respectively). TRT task role scores were a significant individual predictor of all three performance criteria, and social role scores predicted social role performance. Boundary-spanning role scores did not contribute significantly to any of the prediction models. Overall TRT scores demonstrated

incremental validity in relation to all three performance criteria ($\Delta R^2 = .03$ – $.11$). The TRT emerged as the strongest predictor of task and overall role performance ($\beta s = .35$ and $.30$, respectively), whereas agreeableness was the best predictor of social role performance ($\beta = .28$). These results provide strong support for Hypotheses 2 and 3.

Discussion

Our primary goal in this study was to estimate the criterion-related validity of team role knowledge in a sample of academic project teams. The TRT demonstrated useful levels of criterion-related validity in relation to peer ratings of team member role performance. More important, role knowledge provided incremental validity in the prediction of role performance beyond that provided by both mental ability and the Big Five personality factors, which are perhaps the two most widely studied sets of individual difference variables within the teams literature.

In combination, the three subscales of the TRT explained 15%, 6%, and 11% of the variance in task, social, and overall role performance (respectively) beyond that accounted for by mental ability and the Big Five factors. The one exception was that knowledge of boundary-spanning roles did not provide incremental prediction beyond that provided by the alternative predictors. This finding may have been due to the fact that there really were no boundaries to span within these academic teams (and thus knowledge of these roles was less critical), as well as the fact that boundary-spanning role scores exhibited only modest reliability. In addition, agreeableness appeared to be the best predictor of the

Table 4
Results of Hierarchical Multiple Regression Analyses for Study 2 Variables

Model/predictor	Criteria								
	Task role performance			Social role performance			Overall role performance		
	β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2
Alternative predictors		.14*			.15*			.13	
Mental ability	.02			.00			.04		
Agreeableness	-.06			.22*			-.02		
Conscientiousness	.03			.03			.02		
Emotional stability	-.18*			-.10			-.16		
Extraversion	.22*			.12			.22*		
Openness	-.16			-.12			-.14		
TRT subscores		.29**	.15**		.21**	.06		.24*	.11*
Task roles	.47**			.19*			.41**		
Social roles	.04			.19*			.04		
Boundary-spanning roles	-.16			-.12			-.18		
Alternative predictors		.14*			.15*			.13*	
Mental ability	.06			.02			.05		
Agreeableness	.02			.28**			.06		
Conscientiousness	.06			.03			.05		
Emotional stability	-.23*			-.12			-.21*		
Extraversion	.22*			.11			.22*		
Openness	-.20*			-.14			-.18		
Overall TRT scores	.35**	.25**	.11**	.21*	.18**	.03*	.30**	.20**	.07**

Note. TRT = Team Role Test; Openness = openness to experience. Standardized regression coefficients (βs) are from the second step of the regression model.
* $p < .05$, one-tailed. ** $p < .01$, one-tailed.

social role performance of team members, which is consistent with past research that has linked this trait to the social aspects of teamwork (e.g., Mount, Barrick, & Stewart, 1998).

Study 3: Validation of TRT in a Work Setting

The results of Study 2 suggest that team role knowledge is a potentially important determinant of team role performance within an academic setting. Nonetheless, academic project teams may differ from work teams in important respects, such as the extent to which the teams are interdependent. Our purpose in Study 3 was to examine the validity of the TRT for predicting team member role performance within production work teams. As before, we suggest that team member role knowledge is a direct antecedent of role performance. The results of Study 2 indicated that team members with higher levels of role knowledge were able to respond more effectively to team situations than were members with lower levels of role knowledge. Considering these facts together, we hypothesized the following:

Hypothesis 4: Team role knowledge would be positively related to team member role performance within a work setting.

Method

Participants

Participants were 82 members of production and maintenance teams involved in the food manufacturing industry. Of the participants, 96.4% were White (the rest were African American) and 53% were female; the average age was 38.83 years ($SD = 10.08$). Each team comprised between 2 and 7 members, with an average of 5.00 members ($SD = 1.30$). Participants had been members of their respective teams for an average of 3.36 years ($SD = 2.79$).

Teams were responsible for the production, cost control, and maintenance of several product lines and would be considered teams according to currently accepted definitions (e.g., Guzzo & Dickson, 1996). For one, they were perceived by their members and others in the organization as distinct entities. The teams had a strong sense of their own identity, which was reflected in the fact that they had a very stable membership over time, and there was very little movement from one team to another. Second, they were interdependent, because they performed their tasks as a team. Team success required the performance of all team members; otherwise, the work could not be accomplished. Furthermore, each team member depended on the preceding team member to complete his or her task, and a failure at one point in the production process affected all subsequent steps (i.e., the tasks were sequentially interdependent). Finally, the teams were embedded within the context and goals of the larger organizational system. Taking these facts together, we concluded that this organization provided an appropriate setting within which to examine team-based selection.

The teams were product centered, such that each team was responsible for the production of a particular food product (e.g., soup). Teams engaged primarily in machinery maintenance (e.g., installing, moving, and troubleshooting equipment) and material handling (e.g., scheduling, delivering, and controlling inventory). Team members performed a variety of tasks, including execution

tasks (e.g., adding ingredients to mixers), decision-making tasks (e.g., quality control of product and packaging), negotiation tasks (e.g., scheduling work with team members), and generation tasks (e.g., troubleshooting production problems), from the task circumplex (McGrath, 1984). The work of each team also involved varying degrees of interdependence. Whereas many of the execution tasks were arranged in a sequentially interdependent fashion, the decision-making and negotiation tasks required a greater degree of intensive interdependency (Grandori, 1997; Thompson, 1967). Further, these teams possessed elements of autonomous work teams and externally managed teams (Cohen et al., 1996). All team members were cross trained to perform several of the jobs required to produce their product, which provided the team with flexibility in its work arrangements. In addition, the team itself was responsible for staffing the various positions on the production line. Such discretion and decision making are characteristic of an autonomous work team.

Measures

Team role knowledge. We measured team role knowledge using the TRT described in Study 2. However, to maximize face validity, we changed the setting (but not the underlying situation) of many of the scenarios, so that they reflected a manufacturing and production context. Example settings included a mechanical support team reacting to workload changes, a self-directed production team selecting a new team member, and a work team making budget allocations. Reliability estimates for this version of the test were highly similar to those found in Study 2. Alpha coefficients for task, social, and boundary-spanning role scores were .81, .70, and .59, respectively. The estimated reliability of overall role knowledge scores was .84.

Team role performance. We measured team member role performance using the instrument described in Study 2. Each team member was evaluated by a minimum of 2 peers and a maximum of 5 ($M = 2.50$, $SD = 1.24$). Thus, in contrast to Study 2, every participant in this sample had role performance information from at least 2 of his or her peers. As in the previous study, we created role performance composites by averaging the relevant role-level ratings. We also created an overall role performance composite. The intraclass correlations for the role performance composites ranged from .45 to .52, and the r_{wg} coefficients ranged from .79 to .94 (see Table 5).

Team tenure. Some scholars (e.g., Moreland & Levine, 1982) have suggested that tenure in a team can influence the roles that individuals perform. For instance, more tenured team members may be more likely to assume a Contractor role by suggesting task allocations, setting deadlines, and motivating members to achieve team goals. Conversely, less tenured members may be more likely to take a Creator role by suggesting new approaches to accomplishing the team's work or perhaps a Critic role by challenging existing strategies and assumptions. Tenure may increase role knowledge and performance, as team members gain more experience in different roles. Therefore, we measured amount of time each member had been with his or her current team and used tenure as a control variable in all analyses. Team member tenure ranged from 2 months to about 2 years, with a mean of 40 months ($SD = 33$ months).

Table 5
Descriptive Statistics, Reliability Estimates, and Intercorrelations for Study 3 Variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
TRT scales										
1. Task roles	4.02	0.29	(.81)	.44**	.35**	.86**	.29**	.12	.23*	.23*
2. Social roles	4.00	0.39	.45**	(.70)	.50**	.77*	.19*	.13	.08	.21*
3. Spanning roles	3.73	0.33	.44**	.51**	(.59)	.69**	.11	-.02	.10	.08
4. Overall	3.95	0.26	.88**	.76**	.73**	(.84)	.27**	.11	.20*	.24*
Team role performance										
5. Task roles	3.91	0.42	.32**	.25*	.19*	.33**	(.93)	.49**	.30**	.94**
6. Social roles	3.55	0.50	.15	.19*	.07	.18	.40**	(.86)	.18	.67**
7. Spanning roles	3.75	0.73	.27**	.11	.13	.24*	.25*	.14	(.79)	.24*
8. Overall	3.76	0.39	.26*	.27**	.16	.30**	.91**	.63**	.20*	(.94)

Note. $N = 82$. TRT = Team Role Test; Spanning = boundary spanning. Reliability estimates are along the diagonal in parentheses. Coefficient alphas are shown for the predictors, and $r_{\text{within-group}}$ coefficients are shown for the criteria. Observed correlations appear above the diagonal, and partial correlations (controlling for team tenure) appear below the diagonal.

* $p < .05$, one-tailed. ** $p < .01$, one-tailed.

Procedure

We administered the study measures to participants in groups of 2–11 employees. We explained that our general purpose in the research was to develop a measure of knowledge of working in a team. Participants were informed that their individual results would remain confidential and would not be shared with the organization. Participants completed the TRT and then role performance ratings. We maintained this order to avoid contamination in the role knowledge scores due to previous exposure of participants to the roles in the performance measure.

Results

Descriptive statistics, reliability estimates, and intercorrelations are presented in Table 5. We report partial correlations, in addition to observed correlations, to control for the influence of team member tenure. As shown, the relationship between role knowledge and role performance was somewhat stronger when we controlled for the differing tenures of team members.

As with the academic samples, we investigated whether the TRT yields higher or lower scores for members of different subgroups. In line with previous results, female team members tended to obtain higher scores than did males across the TRT subscores ($d = -0.16$ to -0.37) and overall ($d = -0.22$). However, none of these differences were statistically significant. We also examined scores by respondent age. Correlations between TRT scores and age ranged from $-.09$ to $.18$; all of these correlations were nonsignificant. The correlation of $.03$ for overall TRT scores suggests that age did not have a strong influence on role knowledge.

Our study hypothesis was that role knowledge would be positively related to role performance. The overall pattern of bivariate correlations was similar to that found with the academic project teams in Study 2. All TRT scores were positively and significantly related to task role performance ratings; TRT social role scores were related to social role performance; TRT task and overall role scores were related to boundary-spanning role performance; and all TRT scores except boundary spanning were related to overall role performance. In terms of the magnitude of these relationships, correlations between role knowledge and overall performance

ranged from $.16$ for boundary-spanning knowledge to $.30$ for overall role knowledge.

We used hierarchical multiple regression analysis to assess the relative contribution of the TRT scores to predicting task, social, boundary-spanning, and overall role performance. As in Study 2, we evaluated two sets of prediction models. In the first set, we regressed each role performance variable on team tenure in the first step and added the three TRT subscores in the second step. In the second set of models, we regressed the role performance variables on overall TRT scores.

The results are displayed in Table 6. TRT subscores provided incremental validity beyond team tenure for the prediction of task and overall role performance ($\Delta R^2 = .10$ and $.09$, respectively). Tenure was positively related to role performance in all four models, and TRT task role scores were positively related to performance in all models except the social role performance criterion. In contrast, TRT social and boundary-spanning role scores did not contribute significantly to any of the prediction models. Finally, overall TRT scores demonstrated incremental validity beyond team tenure in the prediction of all performance criteria ($\Delta R^2 = .04$ to $.09$). Taken as a whole, these results provide support for Hypothesis 4.

Discussion

The results of this study provide evidence that the criterion-related validity of team role knowledge generalizes to work teams within a work setting. Consistent with the Study 2 results, task, social, and overall TRT role scores were significantly related to peer ratings of team member role performance. Tenure within a team also emerged as a fairly strong predictor of role performance. Nevertheless, TRT scores provided incremental validity beyond tenure in relation to all role performance variables. Together, the three TRT subscales accounted for between 7% and 10% of the variance in role performance beyond team tenure.

General Discussion

Teams have become an essential way for managers to structure work in today's organizations. It is therefore critical to understand

Table 6
Results of Hierarchical Multiple Regression Analyses for Study 3 Variables

Model/predictor	Criteria											
	Task role performance			Social role performance			Boundary-spanning role performance			Overall role performance		
	β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2
Team tenure	.41**	.11**		.31**	.07**		.20*	.02		.39**	.10**	
TRT scales		.21**	.10**		.14**	.07		.09	.07		.19**	.09*
Task roles	.29**			.19			.28**			.22*		
Social roles	.09			.18			-.03			.16		
Boundary-spanning roles	-.01			-.13			.02			-.06		
Team tenure	.41**	.11**		.32**	.07**		.19	.02		.39**	.10**	
Overall TRT scores	.32**	.20**	.09**	.22*	.11**	.04*	.25**	.07*	.05**	.28**	.18**	.08**

Note. TRT = Team Role Test. Standardized regression coefficients (β s) are from the second step of the regression model.
 * $p < .05$, one-tailed. ** $p < .01$, one-tailed.

and predict effective team member contributions. The first goal of the present research was to introduce the concept of team role knowledge as a potentially important determinant of behavior in team contexts. Research on dispositional antecedents of role behaviors is extremely limited, and the studies that have examined role antecedents have tended to focus either on behavioral descriptions or on personality-related constructs. We suggest that knowledge of team roles and the situations in which different roles are needed is an important individual difference that, until now, has not been considered within the teams literature. Indeed, team members who possess the knowledge necessary to perceive changes in role requirements and to adapt their role to those requirements are likely to be more effective than are those team members who do not possess this type of knowledge.

Our second goal in this research was to develop and validate a SJT-based measure of team role knowledge for use in team member selection. The overall results revealed the existence of individual differences in role knowledge, as measured by the Team Role Test (TRT). These individual differences, in turn, correlated significantly with peer ratings of team role performance in both academic and work settings. Observed estimates of criterion-related validity were in the .30 range in both samples. Correcting these validity estimates for criterion unreliability would yield operational validities of around .45 for overall TRT scores in relation to overall role performance. These corrected validities may still underestimate the predictive power of team role knowledge, when one considers the possible range restriction (in both role knowledge and role performance) inherent within the concurrent samples we used to validate the TRT.

Another promising finding is that role knowledge predicted team member role performance more than did mental ability, the Big Five personality factors, and team tenure. Not only did role knowledge demonstrate incremental validity, but TRT scores generally were stronger predictors of role performance than were the other variables. One likely reason for this finding is that role knowledge is more proximal to the behaviors that make up role performance than are distal constructs, such as ability and personality. Relatedly, the conceptual match between the constructs the TRT and the role performance measure were designed to assess was much closer than was the match between the constructs underlying the alternative predictors and role performance.

Furthermore, previous research has found moderate-to-large correlations between mental ability and SJT scores (e.g., McDaniel et al., 2001), including scores on situational tests designed to predict team member performance (Stevens & Campion, 1994). Conversely, we found that TRT scores were only modestly correlated with mental ability. Thus, not only was there evidence to suggest that role knowledge can predict team member role performance, but the modest relationship with ability reduces the likelihood that use of the TRT will result in large ethnic group differences and, in turn, reduces adverse impact against minority applicants. Results with regard to gender and age also appear promising, in that the TRT yielded small-to-moderate gender differences that were statistically nonsignificant or that favored female respondents, and role knowledge was unrelated to participant age in the work sample.

In sum, these findings suggest that team role knowledge may be a very useful attribute for managers to assess when staffing work teams in organizations. The TRT has demonstrated predictive validity, low correlations with mental ability and personality, and small subgroup differences; in addition, it should be relatively efficient to administer and score in a field setting. Specifically, a staffing specialist or manager would have a key indicating whether each of the 90 items (10 per role scenario) is role consistent or role inconsistent. Scoring the test would proceed as follows: Recode the effectiveness ratings for the role-inconsistent behaviors, average the ratings within each scenario, and then average the scenario scores to derive role category and/or overall role knowledge scores to facilitate selection decisions.

Study Strengths and Limitations

Several strengths and limitations of this study should be considered when interpreting the results. One strength is that we investigated team role knowledge using data from real teams in both academic and work settings. However, the sample sizes for the individual studies were rather modest. Although we had sufficient power to detect statistically significant relationships among the variables, we may have been unable to detect smaller effects that have substantive meaning.

A second strength of this study is that we were able to examine the criterion-related validity of team member role knowledge for

predicting role performance. In addition, using fellow team members as raters allowed us to obtain performance information from multiple perspectives. At the same time, the use of peer ratings raises questions about how well team members were able to monitor certain role behaviors (e.g., boundary-spanning roles). Collecting role performance ratings from supervisors or managers, who may be better able to observe and evaluate some types of role behaviors, would have further strengthened our conclusions regarding the validity of role knowledge.

Moreover, we collected data on team member role performance, because, conceptually, this criterion is most closely aligned with team member role knowledge. However, we did not examine whether role knowledge is also a useful predictor of team member job performance or the extent to which it provides incremental validity beyond other predictors in relation to job performance. For jobs in which most or all of one's work is performed within a team context, team member role performance and job performance are likely to exhibit considerable overlap, both theoretically and empirically. However, for jobs in which teamwork represents a more modest proportion of one's work (e.g., 25% of work involves the team and 75% involves individual work), role knowledge may be less predictive of job performance than of role performance. Relations between role knowledge and team member job performance also may be weaker in jobs that have very strong or specialized task requirements that are not adequately captured within the task role dimensions. In sum, we need to be cautious about generalizing conclusions concerning the criterion-related validity of the TRT (and the team role knowledge construct more generally) to the prediction of team member job performance.

Directions for Future Research

This study represents an initial investigation of the team role knowledge construct; thus, future research is needed to replicate and extend our findings. First, subsequent research should examine the validity of role knowledge in additional organizational, work, and team contexts. It is likely that some roles are more relevant in some contexts than in others, and future research should investigate whether there are situational variables that moderate the predictive validity of role knowledge. For example, the members of the teams we studied may have had limited opportunities to engage in boundary-spanning role behaviors. The work-setting teams, for instance, were manufacturing oriented and tended to operate within the boundaries of their specific products. These teams also had responsibility for a variety of staffing and scheduling decisions, which reduced their need to interface with management. Future research should study teams that have greater contact with outside entities to examine whether boundary-spanning role knowledge has a relatively larger influence on team role performance than what we observed.

We administered the TRT to members of existing teams. Our hope, however, is that this instrument will prove to be an effective tool for selecting new team members. Because the TRT measures one's knowledge of when to adopt certain team roles, we do not have strong concerns about applicant response distortion. Indeed, situational tests that include knowledge instructions (e.g., "Rate the effectiveness of each response") are thought to be less susceptible to faking than are tests that include behavioral tendency instructions (e.g., "What would you do?") (McDaniel, Hartman,

Whetzel, & Grubb, 2007). However, applicant and nonapplicant samples may differ on other potentially influential variables, including amount and variability of test-taking motivation and teamwork knowledge, skills, and experience. Thus, an important avenue for future research is to examine the validity and psychometric characteristics of the TRT in applicant settings.

The present research provides strong evidence that team role knowledge is related to team member role performance. Future studies should investigate whether role knowledge also predicts team member job performance. As noted, the extent to which one's work is performed within a team versus individually may influence the validity of role knowledge in relation to job performance. Future research could shed light on this possibility. Researchers could also examine whether role knowledge is differentially related to more specific job performance criteria. For instance, task role knowledge may be a better predictor of task performance, whereas social role knowledge may be a better predictor of citizenship performance (although there is some evidence that task and citizenship behaviors may be less distinct in team settings, due to interdependence among team members; Morgeson et al., 2005). Moreover, we examined the relationship between the role knowledge of individual team members and their performance in those roles. Future research might investigate how team members' collective role knowledge impacts overall team performance.

We found that team member role knowledge predicted role performance beyond mental ability and the Big Five personality factors. Future studies should attempt to replicate and extend these initial results. For instance, recent research results have indicated the potential value of considering narrower personality traits for selection (e.g., Dudley, Orvis, Lebiecki, & Cortina, 2006). Researchers could also examine whether the TRT provides incremental validity beyond narrow traits that may be more relevant to role performance than are the broad Big Five factors we examined. As an example, the achievement and dependability facets of conscientiousness may be differentially related to task role knowledge and performance, and the ambition and sociability facets of extraversion may be differentially related to social role knowledge/performance.

The TRT was designed to measure knowledge of when to engage in certain team roles. Although job-relevant knowledge tends to be a good predictor of actual behavior (e.g., McCloy et al., 1994; Schmidt et al., 1986), other factors are likely to impact how team members perform certain roles. For example, motivation and skills may determine whether and how well, respectively, one performs a particular role. Thus, future research might consider additional ways to conceptualize and measure predictors of role performance. For example, structured interview questions could be designed to measure one's motivation to engage in different team roles, and assessment-center-type exercises could be developed to tap role-specific skills.

Furthermore, we suggested that one way in which role knowledge may influence role performance is by increasing the role repertoires of team members. In turn, a broad role repertoire allows members to adapt their role in response to changes in the team's situation. The concept of role adaptability deserves more research attention. For instance, future research might examine relations between role knowledge and the extent to which members take on varying team roles and the effectiveness with which they adapt to those roles.

Another important need for future research is to investigate the extent to which measures of team role knowledge yield subgroup differences when used for selection. The present results indicated only a modest relationship between role knowledge and mental ability. Unfortunately, we were unable to estimate subgroup effect sizes, due to the ethnic homogeneity of our samples. Future research is needed to shed light on this and other factors on which selection measures are evaluated (e.g., test fairness and applicant and user reactions).

Further refinement of the TRT may be needed. For instance, we used one scenario to measure each team role and then combined these individual scores to create role-category-level predictor composites. This method is consistent with how SJTs (and knowledge tests more generally) typically are used. It may be advantageous, however, to develop an additional scenario or two for each role and perhaps to include fewer response alternatives per scenario, which would maintain a reasonable test time. Including additional scenarios would be particularly important for researchers interested in measuring knowledge of individual team roles. The Cooperator role, in particular, would benefit from the development of additional scenarios.

In addition, we have noted that relatively few studies have estimated the temporal stability of scores on SJTs. Given that situational tests often are complex with regard to the nature of the situations and/or the number of alternative actions the respondents must evaluate, it would be useful for future research to estimate the test-retest reliability of tests such as the TRT. These estimates would be particularly helpful, given that internal consistency reliability estimates for SJTs can be difficult to interpret due to the heterogeneity of test content and the scoring of items (e.g., by selecting the best and worst actions).

Finally, researchers have identified a variety of ways to score SJTs (see Weekley et al., 2006). We used what has been referred to as a construct-based approach (Weekley et al., 2006), whereby effectiveness ratings of each action were scored according to whether the action reflected a role-consistent or a role-inconsistent behavior. However, future research might compare alternative ways to score the TRT. For example, one possibility would be to investigate the magnitude and stability of criterion-related validity estimates derived from empirically based scoring approaches.

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Appendix A

Sample Team Role Test (TRT) Item (Calibrator Role)

You are a member of a sales team at a local bookstore, where recent sales have been decreasing substantially due to a shrinking number of customers. You are in a team meeting discussing solutions to the declining sales problem. The discussion becomes

a bit heated when the oldest team member suggests that the sales numbers for the new sales reps are quite low. One of the younger reps quickly counters that every time he asks for help with a customer, the older rep takes credit for the sale. The other new sales rep simply looks at the floor and says nothing.

Please rate the effectiveness of each of the following responses.

	Very ineffective	Somewhat ineffective	Neutral	Somewhat effective	Very effective
Get the quiet new sales rep involved by asking if she has noticed that the older sales rep has taken some of her sales as well (role inconsistent).	1	2	3	4	5
Remind the two sales reps that personal attacks are not appropriate and that the team should focus on the future solutions.	1	2	3	4	5
Support the new team members by taking their side to make sure they are not used as "scapegoats" for the team's problems (role inconsistent).	1	2	3	4	5
Remind the team that making critical remarks about specific people makes people defensive and will prevent the members from accomplishing anything as a team.	1	2	3	4	5

Appendix B

Sample Team Role Performance Measure

Instructions

Please read through each role description and related actions. Then indicate the extent to which each of your team members performs the actions when needed for team effectiveness.

Calibrator Role

Role description.

Helps the team members get along together by helping to settle conflicts, dealing with difficult problems, and being respectful.

1. Helps to settle conflicts between members of the team.

2. Suggests positive ways for the team members to interact, such as taking turns, showing respect, and being open to new ideas.
3. Steps in to help resolve the difficulties, if there are negative feelings in the team.

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