

THE IMPACT OF PERSONALITY, INFORMAL ROLES, AND TEAM INFORMAL
ROLE CONFIGURATION ON TEAM EFFECTIVENESS

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ABSTRACT

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As organizations use more and more work teams, selecting and assembling effective teams is becoming increasingly important. Past research and theory has demonstrated that informal roles serve as a critical linking mechanism between individual-level characteristics such as personality and team-level effectiveness. The present study builds upon this area of research and theory by testing the individual-level link between personality and informal roles and the team-level link between team informal role configuration and team effectiveness. These links were tested using a sample of 152 undergraduate students participating in 38 teams of four. The teams engaged in an information-sharing business simulation where the goal was to generate the highest possible profits across two simulated business years. At the individual level, the Big Five personality dimension Agreeableness positively and significantly correlated with the adoption of the Communicator role, while the relationship between Conscientiousness and the Contractor role approached significance. With regard to the team level, a positive relationship was found between the number of Completer roles performed within a team and the level of team effectiveness for the first simulated

business year, and the relationship between the total number of informal roles performed within a team and team effectiveness in the first simulated year was found to be marginally significant. Using a criterion profile analysis approach, two criterion patterns were identified in which optimal informal role configuration patterns yielded high levels of team effectiveness. Overall, results from this study lend some support to the demonstrated links between personality and informal roles and informal role configuration and team effectiveness, which have important implications for organizational selection and employee development.

CHAPTER 1. INTRODUCTION

The term *team* refers to an interdependent collection of individuals working together toward a shared and valued goal, objective, or mission (Hackman, 1987). Estimates suggest that nearly half of all organizations in the United States employ at least one or more work teams (Devine, Clayton, Philips, Dunford, & Melner, 1999). Typically, these teams are used to accomplish tasks, meet goals, and achieve objectives (Ilgen, Major Hollenbeck, & Sego, 1993). Teams are made up of individuals, and as these individuals work together, they engage in behaviors that may or may not contribute to their team's effectiveness. As such, there is value in investigating and identifying behaviors that contribute to team effectiveness.

Stewart, Fulmer, and Barrick (2005) suggested informal roles serve as critical linking mechanisms between individual characteristics (e.g., personality) and team effectiveness, where *informal roles* (also referred to as team roles) are the behavioral patterns and tendencies emerge (Forsyth, 1998; Mumford, Iddekinge, Morgeson, & Campion, 2008; Stewart et al., 2005). At the team level, past research has demonstrated links between a team's *informal role configuration* (i.e., the collection of all informal roles represented within a team) and its effectiveness (e.g., Chong, 2007; Partington & Harris, 1999; Stewart et al., 2005). At the individual level, links have been demonstrated between an individual's personality and the adoption of informal roles (e.g., Blumberg,

2001; Mumford et al., 2008; Stewart et al., 2005). The link between informal role configuration and team effectiveness, however, has only been tested with roles from two taxonomies, despite the development of several other informal role taxonomies. Further, additional empirical support of this link could be of great practical significance. To the extent that the informal role configuration to team effectiveness link is significant, informal roles could be measured and developed in both new teams and existing teams to implement and identify configurations that are likely to increase team effectiveness. Therefore, for both theoretical and applied reasons, this area of research is underdeveloped and in need of further investigation.

Also of practical importance is the ability to predict team members' adoption of informal roles. As indicated above, one potential predictor of informal roles is *personality*, which refers to a person's characteristic patterns of thought and behavior (Funder, 2001). Because personality remains relatively stable across situations, one's personality should influence the adoption of situation-dependent behavior clusters such as informal roles (Stewart et al., 2005). As such, assessing a person's personality may prove to be an effective way of predicting the informal roles the person will perform. In summary, the present study will investigate if personality can be used by organizations to develop teams in which, in terms of team effectiveness, an optimal set of informal roles is fulfilled by team members.

1.1. Conceptual Framework

For the purposes of the present study, I have adapted the general conceptual model presented by Stewart et al. (2005) as it addresses informal roles from a multiple

levels of analysis perspective. The model (see Figure 1) consists of four constructs linked by arrows indicating theoretical relationships. The theoretical linkages exist in this order: (a) personality, (b) informal roles, (c) informal role configuration, and (d) team effectiveness. Further, it identifies constructs existing at the individual level of analysis as well as the team level. At the individual level, the model indicates that the nature of an individual's personality should influence the informal roles that he/she adopts. At the team level, a team's informal role configuration is theorized to influence its degree of team effectiveness. Between levels of analysis, situational demands represent cross-level phenomena and, accordingly, exert influence on the emergence of individual-level informal roles to team-level informal role configuration. Therefore, in summary, informal roles and informal role configuration serve as linking mechanisms between personality and team effectiveness.

The following literature review is organized into two parts in accordance with the conceptual model. The first part investigates the team-level link between informal role configuration and team-effectiveness by reviewing the literatures of informal roles, informal role configuration, and team effectiveness as well as research assessing the relationship between informal role configuration and team effectiveness. The second part investigates the individual-level link between personality and informal roles by first reviewing the personality literature and then reviewing research that has explored the relationship between personality and informal roles.

1.2. Previous Theory and Research

Informal Roles

Roles may be divided into two types: (a) formal and (b) informal (Hare, 1994). A *formal role* corresponds to a person's officially designated status, position, or title within the team and entails clusters of behaviors related to his or her official duties and responsibilities (Hare, 1994). For example, organizations often officially appoint a person to fill the role of team leader, and that decision is formally communicated to team members. Therefore, a formal role corresponds to those behaviors a person is *supposed* to perform. In contrast, an informal role represents a person's *actual* behavior patterns as opposed to the duties and responsibilities that he or she is *supposed* to perform (Hare, 1994). In other words, formal roles prescribe how team members *should* behave, whereas informal roles reflect how team members *do* behave.

Informal roles emerge in response to team member interactions in a specific team context (Katz & Kahn, 1978; Stewart et al., 2005). The manner in which team members interact is influenced by individual characteristics (e.g., personality) and situational demands (e.g., the nature of a team's task, the formal roles already in place). An informal role refers to the context-specific pattern of related behaviors that a team member adopts as a result of team interaction (Mumford et al., 2008; Stewart et al., 2005).

In general, an individual's performance of an informal role may be conceptualized in two ways. The first conceptualization views informal roles as continuous variables, and accordingly, the extent to which an individual performs an informal role varies along a continuum. With regard to the second conceptualization, informal roles are conceived

as dichotomous phenomena, and as a result, an individual either performs an informal role or does not. For the purposes of the present study, informal roles are conceptualized as dichotomous phenomena.

Informal Roles Taxonomies

In order to classify and organize related behaviors into distinct informal roles, researchers and practitioners alike have developed a variety of taxonomies for informal roles. Over the past 60 years, a number of informal role taxonomies and related measures have been introduced (e.g., Bales, 1950; Belbin, 1981, 1993; Benne & Sheats, 1948; Dubrin, 1995; McCann & Margerison, 1995). Benne and Sheats (1948) offered one of the first, and their taxonomy consists of 27 informal roles grouped into three broad role categories: (a) task, (b) building and maintenance, and (c) individual. The *task* role category includes 12 informal roles, where people filling these roles tend to facilitate and coordinate the processes necessary for successful task completion. The *building and maintenance* role category, on the other hand, includes seven informal roles, all of which should directly contribute to a team's positive social interactions and indirectly contribute to team task completion. The *individual* role category consists of eight roles that are either self-serving or not in alignment with the team's goals and, consequently, tend to be detrimental to team task success and result in ineffective social interactions. In other words, roles in the individual category are dysfunctional, while those in the former two categories are functional.

Two years after Benne and Sheats (1948), Bales (1950) published an informal role taxonomy consisting of 12 key behaviors that are conceptually synonymous with

informal roles. Like Benne and Sheats' taxonomy, Bales' taxonomy divides informal roles into role categories. Bales' taxonomy, however, contains just two categories, *task* and *socioemotional*, with six roles each. These two categories are defined similar to Benne and Sheats' task and building and maintenance categories (respectively). Thus, in his separate line of research, Bales arrived at a similar conclusion that informal roles may be grouped into task or social categories; unlike Benne and Sheats, however, Bales did not include dysfunctional roles as Benne and Sheats did with their individual category.

Belbin (1981, 1993) continued the emphasis on functional roles (i.e., roles contributing to successful task completion and team interaction) when he developed his own informal role taxonomy based on 9 years of observing managers in training courses. His taxonomy originally included eight informal roles (Belbin, 1981), although it was later expanded to nine (Belbin, 1993). In contrast to Benne and Sheats (1948) and Bales (1950), Belbin did not group his roles into categories. Largely, Belbin's taxonomy has received the most empirical attention relative to the aforementioned taxonomies when it comes to assessing the link between informal role configuration and team effectiveness.

In addition to the more widely cited taxonomies of Benne and Sheats (1948), Bales (1950), and Belbin (1981, 1993), other taxonomies have been developed over the past three decades (e.g., Ancona & Caldwell, 1988, 1992; Barry, 1991; Davis, Millburn, Murphy, & Woodhouse, 1992; Dubrin, 1995; McCann & Margerison, 1989, 1995; Parker, 1994, 1996; Woodcock, 1989). In particular, Ancona and Caldwell's (1988, 1992) taxonomy has made a lasting and unique contribution to the conceptualization of informal roles. In their taxonomy, they emphasized *boundary-spanning* roles that include behaviors that span across team boundaries. Specifically, boundary-spanning roles

consist of behaviors that have an external focus and bridge the gap between the team and other teams or between the team and the organization. Consequently, people performing such roles tend to act as inter-team liaisons.

In summary, multiple taxonomies exist in the literature. In general, the majority of taxonomy developers have focused exclusively on functional informal roles (i.e., Ancona & Caldwell, 1988, 1992; Bales, 1950; Barry, 1991; Belbin, 1981, 1993; Davis, Millburn, Murphy, & Woodhouse, 1992; Dubrin, 1995; McCann & Margerison, 1989, 1995; Parker, 1994, 1996; Woodcock, 1989), with the notable exception of Benne and Sheats (1948). Further, Benne and Sheats and Bales (1950) independently arrived at task and social (e.g., building and maintenance, socioemotional) role categories, while Ancona and Caldwell (1988, 1992) introduced a new category consisting of boundary-spanning roles. Finally, for the most part, the previously mentioned researchers developed their taxonomies independent of one another. This approach yielded some unique contributions to the literature as well some convergence in theory, but it also resulted in a disjointed informal roles literature in need of integration.

Integrating Informal Role Taxonomies

As evidenced by the previous section, multiple informal role taxonomies exist and some overlap substantially in terms of the behavior clusters assessed, but each also introduces new role types. Recognizing the disjointed nature of the informal roles literature, Mumford, Campion, and Morgeson (2006) developed an informal role taxonomy that integrates over 120 roles from different taxonomies. Their integrated taxonomy does not include dysfunctional roles (i.e., roles that are a detriment to team

success), such as the roles falling in Benne and Sheats' (1948) individual role category, because the goal was to include only those role that contribute to successful team functioning.

The Mumford et al. (2006) taxonomy integrates roles from previously published taxonomies in an effort to bring unity to what they considered to be fragmented and disjointed literature on informal roles. The 10 distinct roles in Mumford and colleagues' taxonomy were grouped into one of three role categories: (a) task, (b) social, and (c) boundary-spanning. In a subsequent validation study, however, analysis of the 10-role taxonomy demonstrated low convergent validity between the roles found within the social role category (Mumford et al., 2008). Consequently, Mumford and colleagues revised the taxonomy by eliminating one role, leaving nine informal roles embedded in the three role categories. See Table 1 for a listing of Mumford et al.'s informal role taxonomy and the previous role taxonomies from which it was derived.

The *task role* category includes the informal roles of Contractor, Creator, Contributor, Completer, and Critic. These roles feature behaviors directly associated with accomplishing the team's task objectives. The Contractor refers to behaviors related to organizing and coordinating team activities. The Creator suggests original and/or innovative solutions to the team's task-related problems and provides a fresh perspective with regard to problem solving. The Contributor contributes unique information or expertise to the team. The Completer, on the other hand, spearheads the individual-oriented tasks in the team until completed. Finally, the Critic role covers those behaviors associated with questioning and commenting on the manner in which the team chooses to coordinate and organize information related to meeting objectives.

The second role category deals with the *social roles* and includes the Communicator and Calibrator roles. These roles consist of contextual behaviors that facilitate the team's socioemotional environment. That is, these behaviors support and maintain the team's cohesion, morale, and mood. The Communicator makes interactions pleasant and comfortable by being happy and easy to work with, listening carefully and intently to the thoughts, feelings, and emotions of fellow team members, and striving to communicate personal feelings and thoughts in a respectful manner. The Calibrator performs behaviors that function to observe the team's social processes, make the team aware of the social processes, and suggest changes to the observed social processes (e.g., settle conflicts, resolve negative feelings, suggest positive ways to interact).

The third and final category is called the *boundary-spanning role* category. This category includes the informal roles of Consul and Coordinator, and these roles pertain to behaviors that facilitate team functioning with the external environment (i.e., other teams, the overarching organization, other organizations). The Consul interacts with those external to the team in order to favorably market the team by sharing accomplishments with non-team members, gaining support from important or influential non-team members, and frequently updating non-team members with information about the team's successes. The Coordinator interacts with non-team members to garner information, ideas, and other resources that may improve team decision-making.

In summary, Mumford et al. (2006) integrated over 120 informal roles into a single taxonomy that now consists of nine roles (Mumford et al., 2008) nested within three role categories. The task role category includes the roles of Contractor, Creator, Contributor, Completer, and Critic, while the social role category is made up of the

Communicator and Calibrator roles. Finally, the boundary-spanning role category includes the Consul and Coordinator. To measure the extent to which team members perform each informal role, Mumford and colleagues developed a measure called the Team Role Performance (TRP) test. For a detailed description of the TRP, please refer to the Method section.

Informal Role Configuration

When considered at the team-level of analysis, a collection of informal roles performed within a team is referred to as an *informal role configuration* (IRC), whereby different structures constitute different patterns of activity between team members (LePine, 2003; Stewart et al., 2005). In other words, at the individual level, an informal role represents a cluster of related behaviors, and at the team level, an IRC is assumed to represent standardized interaction patterns between informal roles performed.

Past research and theory have approached IRC in different ways based on different conceptualizations of individual-level informal roles. As mentioned previously, informal roles may be conceptualized as continuous or dichotomous phenomena. With respect to the first conceptualization, to aggregate continuous variables from the individual level to team level, principles of multi-level theory (e.g., emergence) should be applied (Kozlowski & Klein, 2000). Fully describing multi-level theory, however, would require a detailed explanation that is beyond the scope of the present study. In short, these principles stipulate that different statistical techniques (e.g., mean, skew, variance) should be used to characterize aggregated team-level phenomena.

As stated previously, the present study treats informal roles as dichotomous phenomena. The underlying assumption of this conceptualization is that individuals either perform or do not perform informal roles. A primary benefit of approaching informal roles in this way is that team-level IRC are more easily interpretable because they can be described in terms of the number individuals performing each type of role within a team. In the present study, this team-level structure of informal roles is depicted as an IRC *vector* that can be used to describe a number of different configurations. In this context, a vector is a pattern or code that depicts the number of individuals performing each informal role within a team. An example of a vector is 4102310, where the location of each digit in the sequence corresponds to a specific informal role from a seven-role taxonomy. In this example, the fifth digit corresponds to the Critic role and, accordingly, indicates that three team members performed the role.

Past researchers have used different versions of vectors to test the relationship between IRC and team effectiveness. For instance, Belbin (1981) proposed a theory of team balance in which a team was considered balanced and assumed to be more effective if each informal role was filled by at least one team member. Similarly, with respect to Bales' (1950) taxonomy, imbalance was defined as teams having or possessing a disproportionate number of task category roles in relation to social category roles or a disproportionate number of social category roles in relation to task category roles; consequently, imbalanced teams are assumed to be less effective. Bales' conceptualization, however, is limited to taxonomies where an equal number of informal roles are associated with the task and social role categories. In Chong (2007), IRC vectors were used to identify the total number of individuals adopting each role within a team.

Thus, the IRC vector approach is not new, as it has been used by past researchers to both describe a team's IRC and differentiate teams from one another based upon the relationship between variations in IRC vectors and team effectiveness.

Link Between Informal Role Configuration and Team Effectiveness

The relationship between IRC and team effectiveness has been tested in only a handful of studies (e.g., Prichard & Stanton, 1999; Senior, 1997; Stewart et al., 2005). In the present study, the interest lies in those studies using the IRC approach described above in which individual-level informal roles are operationalized dichotomously and IRC are represented by vectors. Interestingly, studies using some variation of this approach have all used informal roles from Belbin's (1981, 1993) taxonomy. *Team effectiveness* is broadly defined as the two constructs of performance and viability (Hackman, 1987; Sundstrom, de Meuse, & Futrell, 1990), where *performance* refers to the quality and/or quantity of a team's outputs and *viability* refers to a team's capability to endure into the future. The present study will focus exclusively on the empirical evidence investigating the link between IRC and the performance subdimension of team effectiveness.

In the empirical literature, the link between IRC and team effectiveness has been investigated using two versions of the IRC vector approach described previously. The first version is known as Belbin's (1981) team balance theory. Although variations of Belbin's team balance theory exist, generally, balance is achieved when at least one individual adopts every role in the taxonomy. Team balance may be coded dichotomously as balanced and imbalanced or continuously as the number of roles within

an IRC filled by at least one person. Studies such as Partington and Harris (1999), Blenkinsop and Maddison (2007), and van der Water, Ahaus, and Rozier (2008) found no support for the relationship between team balance and team effectiveness when using Belbin's (1981, 1993) taxonomy. With that said, Blenkinsop and Maddison (2007) used a sample of just seven teams and, as a result, had little chance of finding a significant relationship, even if one truly existed, given their low statistical power.

On the other hand, Senior (1997) and Prichard and Stanton (1999) found support for the relationship between team balance and team effectiveness, but both studies suffered from notable methodological limitations. Using just 11 management teams, Senior identified informal role performance using a self-report measure, and she operationalized team effectiveness using a technique where each team defined its own effectiveness criteria and rated itself along those criteria. Consequently, teams were not rated based on the same criteria and a common source bias existed because the informal role and team effectiveness measures were both self-report. With respect to Prichard and Stanton, they too used a very small sample (i.e., 12 four-person teams). Moreover, they operationalized team balance using just four of Belbin's nine roles (i.e., Coordinator, Planter, Completer/Finisher, Teamworker), while imbalance was operationalized as teams consisting of four people who each performed only the Shaper role. As such, the significant difference in performance found between balanced and imbalanced teams lacks some degree of generalizability, as it does not take into consideration other roles in Belbin's taxonomy. In conclusion, the studies described above suggest, at most, weak support for the relationship between team balance and team effectiveness.

The second version of the IRC vector approach found in past research relates to the main effects on team effectiveness exhibited by the number of individuals performing a *specific* informal role. Using a sample of 43 MBA graduate student project teams, Partington and Harrison (1999) found a statistically significant relationship between the number of individuals performing Belbin's (1981, 1993) Coordinator role and the level of team effectiveness ($r = -.48$). The negative relationship suggests that team effectiveness tended to decrease as more and more individuals adopted the Coordinator role, regardless of the other roles performed. In a subsequent study, Chong (2007) used 342 management students divided relatively evenly into 33 teams and found significant main effects on team effectiveness for Belbin's Planter ($r = .37$), Shaper ($r = .42$), and Teamworker ($r = .36$) roles. These positive relationships indicate that as the number of individuals performing each of those roles increased, the level of team effectiveness tended to increase as well.

In summary, several studies have investigated the empirical link between IRC and team effectiveness. Of the studies reviewed, all used informal roles from Belbin's (1981, 1993) taxonomy (i.e., Blenkinsop & Maddison, 2007; Chong, 2007; Partington & Harris, 1999; Prichard & Stanton, 1999; Senior, 1997; van der Water et al., 2008). In addition, these studies conceptualized IRC using two versions of the vector approach. Most commonly, studies assessed IRC using some form of team balance based on Belbin's (1981) original theory. The relationship between variations of team balance and team effectiveness, however, received only limited support. In contrast, studies such as Chong (2007) and Partington and Harris (1999) found support that the representation of certain roles may exert main effects on team effectiveness, regardless of the other roles

performed. To date, however, no study has used Mumford et al.'s (2006) integrated taxonomy to explore the IRC and team effectiveness link.

Personality

The term *personality* refers to an individual's characteristic patterns of thought, emotion, and behavior (Funder, 2001), and theories of personality are primarily concerned with the origins, antecedents, and outcomes of those characteristic patterns of thought, emotion, and behavior. In relation to the present study, past studies have explored the relationship between personality and the adoption of informal role behaviors (e.g., Blumberg, 2001; Mumford et al., 2008; Stewart et al., 2005). In light of this, a goal of the present study is to further investigate the link between personality and informal roles. First, however, a review of the personality construct is provided.

Researchers in the I/O psychology literature commonly adopt a *trait/type perspective*, which views personality as relatively stable across situations and, thus, predictable (Funder & Colvin, 1991; Robins, Fraley, Robert, & Trzesniewski, 2001). Accordingly, the present study adheres to this perspective and defines personality as an individual's characteristic patterns of thought, emotion, and behavior (Funder, 2001) that remain relatively stable across situations and time (Funder & Colvin, 1991; Robins et al., 2001). Different approaches to the trait/type perspective exist such as Leary's (1957) interpersonal theory, but the Big Five approach is most common and has gained an increasing amount of empirical attention over the past two decades. The Big Five approach was developed based on work by researchers such as Allport and Odbert (1936), Cattell (1945), Norman (1993), and McCrae and Costa (1985, 1987). In this

approach, personality traits (i.e., facets) are described as a series or a profile of individual dimensions (Saucier & Goldberg, 2003). Specific to the present study, studies such as Barrick, Stewart, Neubert, and Mount (1998) and Morgeson, Reider, and Campion (2005) have investigated the Big Five in the context of work teams. For these reasons, the present study operationalizes personality using the Big Five approach.

Each of the Big Five dimensions encompasses a number of core facets (Barrick & Mount, 1991; Digman, 1990; McCrae & Costa, 1985, 1987). Furthermore, the dimensions of the Big Five are assumed to be independent (McCrae & Costa, 1985). That is, the extent to which a person possesses one dimension should not influence the extent to which the same person possesses another. The first dimension, *Agreeableness*, refers to an individual's behavioral tendency to be compassionate and cooperative, and core facets include being likeable, friendly, and good-natured. A person high in *Conscientiousness* tends to act respectfully and dutifully in a planned and courteous manner and, as a result, may be described as achievement-oriented, responsible, and organized. *Extraversion* refers to a person's tendency to seek interaction and stimulation from others. Core facets of an extraverted person include sociability, assertiveness, talkativeness, and ambitiousness. *Emotional Stability* is defined as a person's tendency to feel emotionally calm and secure, yet it is often described by its negative pole called Emotional *Instability* or Neuroticism. An emotionally instable person tends to experience relatively frequent fluctuations in emotion, and core facets of this dimension include feelings of anger, depression, anxiety, and vulnerability. Finally, *Openness to Experience* is a bit more difficult to define but typically refers to an individual's appreciation of new and diverse ideas, environments, situations, and people. As such, Openness to Experience includes

core facets like being curious, imaginative, broad-minded, and intelligent. Together, these five dimensions make up what is commonly referred to as the Big Five.

Link Between Personality and Informal Roles

The second goal of the current study is to investigate the link between personality and informal roles. Past research has shown statistical relationships between personality and individual behavior and performance (e.g., Barrick, Mount, & Judge, 2001; Tett, Jackson, & Rothstein, 1991). As such, the extent to which an individual possesses a given personality dimension may influence the informal role(s) he or she performs. In the following paragraphs, a review is provided of three studies investigating the relationships between the Big Five and informal role performance.

Using a sample of 207 undergraduate students, Blumberg (2001) calculated the correlations between the Big Five personality dimensions and the task and social role categories of the Bales (1950) taxonomy. Participants completed self-report measures for the Big Five and informal roles. On one hand, the task role category correlated significantly with Agreeableness ($r = .23$) and Conscientiousness ($r = .41$). On the other hand, the social role category correlated significantly with Agreeableness ($r = .45$), Conscientiousness ($r = .24$), Extraversion ($r = .26$), and Neuroticism ($r = -.42$). These findings, however, may not represent the true relationships. First, a common source bias occurred because two self-report measures were correlated with one another. Second, participants were not instructed to reference a specific team context when completing the informal roles measure; therefore, Blumberg did not operationalize informal roles in a manner consistent with the present study's definition. As a result, the Blumberg study

illustrates the importance of providing a specific team context when measuring informal roles.

Stewart et al. (2005) also assessed the links between the Big Five dimensions and informal roles. Study participants consisted of 220 executive MBA students organized in 45 teams, with each team consisting of 4-6 individuals working together throughout an 8-month period. Like Blumberg, Stewart et al. used a self-report measure of the Big Five as well as the task and social role categories of the Bales (1950) taxonomy; although, Stewart et al. used team member ratings instead of self-report ratings, thus, avoiding common source bias. With regard to significant findings, medium-sized positive correlations were found between Agreeableness and the social role category ($r = .25$) and Conscientiousness and the task role category ($r = .25$); meaning, individuals higher in Agreeableness and Conscientiousness tended to perform behaviors associated with the social and task role categories, respectively. In addition, a small positive relationship was found between Emotional Stability and the task role category ($r = .15$), suggesting that an emotionally stable person will tend to perform behaviors consistent with the task role category. Finally, small negative relationships were found between the task role category and the personality dimensions of Openness to Experience ($r = -.16$) and Extraversion ($r = -.13$); these two relationships indicate that individuals high in Openness and Extraversion tended *not* to perform behaviors consistent with the task role category.

Finally, Mumford et al. (2008) provided a specific team context when correlating the Big Five with informal roles from the Mumford et al. (2006) taxonomy. Based upon a sample of four- or five-member academic project teams drawn from 93 undergraduate students, the authors assessed the extent to which participants performed informal roles

consistent with task, social, and boundary-spanning role categories using team member ratings. Two relationships were found to be statistically significant. As in Stewart et al., Agreeableness was moderately related to performing behaviors associated with the social role category ($r = .32$), indicating that people high on the Agreeableness dimension tended to perform roles that contribute to a team's positive socioemotional environment. Contrary to Stewart et al., Emotional Stability was found to be moderately and negatively related to a person's performance on behaviors of the task role category ($r = -.21$); thus, Mumford et al.'s effect size was of larger magnitude and in the opposite direction of Stewart et al. This negative relationship suggests that emotionally stable people tended *not* to adopt roles that contributed directly to a team's task performance.

In summary, three studies have investigated the link between the Big Five personality dimensions and informal roles, but only Stewart et al. (2005) and Mumford et al. (2008) operationalized informal roles in a manner consistent with the present study. First, the latter two studies found Agreeableness to be positively and significantly related to the social role category. Second, both studies found Emotional Stability to be significantly related to the task role category, although the significant correlations were in opposing directions. Third, Stewart et al. found the task role category to have a positive significant relationship with Conscientiousness and negative significant relationships with Openness to Experience and Extraversion. Finally, both Stewart et al. and Mumford et al. correlated the Big Five with role categories (i.e., task and social) and *not* specific informal roles. In light of the fourth and final conclusion, the present study adds value to the extant literature by investigating the relationships between the Big Five and specific informal roles (e.g., Creator, Critic) from the Mumford taxonomy (Mumford et al., 2006).

1.3. Present Study

As described previously, the conceptual framework for the present study involves the individual and team level of analysis (see Figure 1). At the team level, the goal of this study is to investigate the link between IRC and team effectiveness, and at the individual level the goal is to investigate the link between personality and informal roles. To do so, personality, informal roles, and team effectiveness are operationalized using the Big Five, Mumford et al.'s (2006) taxonomy, and team task performance, respectively. Furthermore, team size is held constant at four members per team. Finally, due to the design of the present study, hypotheses related to the boundary-spanning roles of Consul and Coordinator are not included.

Team-Level Hypotheses

Team-level hypotheses refer to the relationships between different operationalizations of IRC and team effectiveness, and they are grouped into two categories: (a) linear and (b) interaction. In addition to the priori hypotheses, inductive and strictly exploratory follow-up analyses will be conducted for which no predictions will be made. Specifically, the present study will identify an optimal IRC vector with respect to team effectiveness. The technique for identifying an optimal IRC vector will be described at length in the Statistical Analyses section.

The linear category consists of hypotheses in which one more or more informal roles in an IRC correlate in a linear manner with team effectiveness. Past studies indicate that main effects exist between specific informal roles and team effectiveness. That is, as more individuals perform a particular informal role, team effectiveness increases in a

linear and additive fashion, regardless of the other roles performed. For instance, Belbin's (1981, 1993) Planter, Shaper, and Teamworker roles were found to share significant and positive moderate-to-strong relationships with team effectiveness (Chong, 2007). Based on Mumford et al.'s (2006) integrative taxonomy (see Table 1), these three roles correspond to Creator, Contractor, and Communicator, respectively. In another study, however, Belbin's Coordinator role shared a strong negative relationship with team effectiveness (Partington & Harris, 1999). Like Belbin's Shaper role, the Coordinator role is conceptually synonymous with Mumford et al.'s Contractor. Due to these conflicting results with regard to the Contractor role, however, significant main effects are only predicted for Mumford et al.'s Creator and Communicator roles.

Hypothesis 1a: The number of Creators on a team will be positively related to team effectiveness.

Hypothesis 1b: The number of Communicators on a team will be positively related to team effectiveness.

Although past research has not found significant relationships between team effectiveness and roles that are conceptually similar to Mumford et al.'s (2006) Completer role, I expect a relationship based on the following logic. Those performing the Completer role take personal responsibility for completing different aspects of the task and following through with those commitments. Furthermore, once critical task information is shared, the Completer may work independently toward fulfilling commitments. Consequently, as more team members adopt the Completer role, their individual outputs should contribute directly toward successful task completion.

Hypothesis 1c: The number of Completers on a team will be positively related to team effectiveness.

When developing their integrative taxonomy, Mumford et al. (2006) included only functional roles, or those thought to be beneficial to successful team functioning. Therefore, it seems reasonable to expect that a team where every role is performed by multiple individuals should be more effective than a team where every role is performed by only one individual or zero individuals. Furthermore, the most effective team should be that in which each team member performs all seven informal roles. Conversely, the least effective team should be that in which the team members do not perform any informal roles.

Hypothesis 1d: The total number of informal roles performed on a team will be positively related to team effectiveness.

Belbin (1981) proposed the theory that balanced teams (i.e., teams with all roles represented) would experience greater team effectiveness. Since then, other researchers have tested Belbin's original theory as well as related variations, and most have found little or no support for the relationship between balanced teams and team effectiveness (i.e., Blenkinsop & Maddison, 2007; Partington & Harris, 1999; Senior, 1997; van der Water et al., 2008). Despite this general lack of support, the present study revisits the team balance theory. In the present study, however, the theory is tested using informal roles from Mumford et al.'s (2006) integrative and more comprehensive taxonomy.

Hypothesis 1e: The total number of informal roles performed by at least one individual on a team will be positively related to team effectiveness.

The interaction category of hypotheses refers to IRC in which the presence of two particular roles results in an interaction effect. In other words, the relationship between IRC and team effectiveness should contain a multiplicative effect when both roles are represented. As an exploratory hypothesis, it is predicted that as more Creators provide more unique decision alternatives, an increasing number of Critics should be needed to evaluate those alternatives.

Hypothesis 2: The interaction between the number of Creators and Critics represented on a team will demonstrate a stronger relationship with team effectiveness than the main effects of the two roles such that the interaction will explain incremental variance in team effectiveness over the two main effects.

Individual-Level Hypotheses

Individual-level hypotheses refer to the predicted relationships between each of the Big Five dimensions and the adoption of specific informal roles. To begin with, people high in Agreeableness exhibit behaviors that are compassionate and cooperative in nature. In a similar manner, roles falling within the social role category (i.e., Communicator, Calibrator) involve compassionate and cooperative behaviors that encourage a positive socioemotional environment within the team. Not surprisingly, Stewart et al. (2005) and Mumford et al. (2008) found a statistically significant relationship between Agreeableness and the social role category. As such, the following hypotheses are proposed.

Hypotheses 3a-b: Agreeableness will be positively related to the adoption of the following roles: (a) Communicator and (b) Calibrator.

As evidenced by Stewart et al. (2005) and Mumford et al. (2008), the extent to which individuals are emotionally stable tends to covary with the extent to which they perform behaviors consistent with the task role category. However, Stewart et al. found a negative relationship, whereas Mumford et al. found a positive relationship. Because of this discrepancy, no hypotheses are offered for the relationship between Emotional Stability and informal roles falling within the task role category (i.e., Contractor, Creator, Contributor, Completer, Critic).

With regard to the Conscientiousness, Stewart et al. (2005) found that individuals higher in this dimension tend to perform behaviors consistent with the task role category. Because of this, individuals high in Conscientiousness should be more likely to perform informal roles associated with the task role category.

Hypotheses 4a-e: Conscientiousness will be positively related to the adoption of the following roles: (a) Contractor, (b) Creator, (c) Contributor, (d) Completer, and (e) Critic.

Previous studies have found that Openness to Experience has a negative and significant relationship with the task role category (Stewart et al., 2005). As such, individuals high in Openness to Experience should be less likely to adopt informal roles associated with the task role category.

Hypotheses 5a-e: Openness to Experience will be negatively related to the adoption of the following roles: (a) Contractor, (b) Creator, (c) Contributor, (d) Completer, and (e) Critic.

Stewart et al. (2008) found that individuals high in Extraversion perform task role category behaviors to a lesser extent than those low in Extraversion. Therefore, it is

proposed that Extraversion should be negatively related to informal roles associated with the task role category.

Hypotheses 6a-e: Extraversion will be negatively related to adoption of the following roles: (a) Contractor, (b) Creator, (c) Contributor, (d) Completer, and (e) Critic.

CHAPTER 2. METHOD

2.1. Participants

Participants were recruited and sampled from the student population of Indiana University – Purdue University Indianapolis. More specifically, the sample originally consisted of 160 undergraduate students recruited from the university’s Psychology Department who were at least 18 years old at the time of the study. Most students participated as part of an introductory psychology course requirement and received course credit. After eliminating two teams, the final sample consisted of 152 students divided into 38 four-person teams, and they were 22.2 years old on average, 71.1% female, and 70.4% white. At the time of the study, participants had completed a mean of 50.2 college credit hours and had a mean cumulative GPA of 3.2 on a 4.0 scale. In addition, 63.2% were employed at the time of participation and worked, on average, 22.0 hours per week. Finally, 77.0% of the sample had previous work team experience, while 2.6% had never been employed.

2.2. Design

In the present study, a correlational design was used and no variables were manipulated. With regard to the team-level component, the informal role configuration (IRC) variable was derived from each team’s collection of informal roles, and team

effectiveness was operationalized as a team's objective performance score calculated from a decision-making task. The team task served as a vehicle allowing informal roles to emerge. At the individual level of analysis, the link between personality and informal roles was assessed. Specifically, the goal was to determine if certain Big Five personality dimensions influence the adoption of certain informal roles.

2.3. Task

Tinsel Town (Devine et al., 2004) is a Hollywood film studio simulation where participants play the part of executives in a top management team. Each management team consists of four vice-presidents, representing the following four film studio departments: (a) Marketing, (b) Industry Research, (c) Script Evaluation, and (d) Talent Appraisal. The goal for each team is to maximize total profit (i.e., revenue minus costs) during two decision periods. In each decision period, teams review a set of 11 potential films and collectively decide which film(s) to produce and how much to spend on marketing, while operating under the constraint of a \$150 million spending budget. The 11 films vary with respect to the cost to produce and how much revenue they generate at different marketing expenditure levels. To complete the task, all members are provided with information for each film that includes a plot summary, a casting list of actors, and a director. In addition, each vice-president receives critical information that is specific to his/her department and not distributed to the other team members. Therefore, to successfully perform the task, team members must engage in information sharing.

For the purposes of this study, teams completed two decision periods. Each decision period lasted 25 minutes and represented a simulated year of production for the

film company. During each decision period, team members collectively chose which screenplays to produce and how much to spend marketing each film. Depending upon how teams spent their \$150 million budget, more than one film could be produced in a decision period. Following each decision period, teams received performance feedback regarding the total profits generated by the films produced. Teams also received a percentage value that indicated how well a team's profit compared to the highest profit possible for the decision period. For examples of Tinsel Town task materials, please refer to Appendix B.

2.4. Measures

Personality

Personality was assessed using a measure of the Big Five obtained from the International Personality Item Pool website (IPIP; Goldberg, 1999b). The IPIP website (<http://ipip.ori.org>) contains a variety of public domain scales and measures that correlate highly with previously published personality measures. For the present study, the Big Five Factor Markers (BFFM) was used to assess the Big Five (see Appendix C). The BFFM is IPIP's 50-item measure equivalent of the Trait Descriptive Adjectives developed by Goldberg (1992), a measure of the Big Five. It is comprised of five scales that correspond to each of the Big Five dimensions (i.e., Agreeableness, Conscientiousness, Extraversion, Emotional Stability, Openness to Experience). Each scale consists of 10 items that ask participants to rate the extent to which test takers view the statement as accurate or inaccurate. Participants rate each item using a 5-point Likert-

type response format with anchors ranging from (1) “Very Inaccurate” to (5) “Very Accurate” with a neutral response of (3) “Neither Accurate or Inaccurate.” Based on past empirical studies, the IPIP website lists the following coefficient alpha reliability estimates for each dimension of the BFFM: Agreeableness (.82), Conscientiousness (.79), Extraversion (.87), Emotional Stability (.86), and Openness to Experience (.84). Based on a sample of 152 participants in the present study, the corresponding coefficient alpha reliability estimates were similar in magnitude to the IPIP values: Agreeableness (.81), Conscientiousness (.83), Extraversion (.86), Emotional Stability (.84), and Openness to Experience (.79).

Informal Roles

A modified version of Mumford et al.’s (2006) Team Role Performance (TRP) test was administered to assess informal role performance and to later dichotomously code whether a participant performed each role. The modified version contains 21-items as opposed to the 27 items found in the original version. The design of the present study (i.e., participants did not interact with others outside of their team) did not warrant the use of items pertaining to the boundary-spanning roles of Consul and Coordinator, so only seven of the informal roles found in the updated 9-role Mumford et al. (2008) taxonomy were assessed. Three-item scales were used to capture each of the seven remaining informal roles. Each item consists of a behavior statement (e.g., “Stepped in if there were negative feelings in the team to help resolve the difficulties.”) corresponding to a specific informal role (e.g., Calibrator). Participants rated each item using a 5-point Likert-type response format ranging from (1) “to no extent” to (5) “to a very great extent.” To

calculate a score for an informal role, the ratings from the three-item subscale associated with that role were averaged.

In order to assess the informal role performance of each participant, two sets of TRP ratings were used. First, each participant completed the self-rating version of the TRP (see Appendix C) and rated himself/herself on those same informal role behaviors. Then, each participant completed the team member-rating version of the TRP (see Appendix C) and rated the extent to which each of his/her three team members demonstrated specific informal role behaviors. In this way, each team member received four sets of ratings (i.e., one self-rating, three team member ratings) related to his/her informal role performance. With regard to coefficient alpha reliability estimates for each informal role self-rating scale, the results were as follows: Contractor (.84), Creator (.85), Contributor (.76), Completer (.75), Critic (.72), Communicator (.83), and Calibrator (.82). As for team member-ratings, the coefficient alpha reliability estimates were calculated for each informal role by assessing a 9-item scale that consisted of 3-item scale ratings completed by each of three team members for the target participant: Contractor (.84), Creator (.82), Contributor (.82), Completer (.74), Critic (.80), Communicator (.74), and Calibrator (.82).

Interrater agreement was also calculated to determine the extent to which raters (i.e., one self, three team members) agreed regarding each participant's informal role performance. First, interrater agreement was calculated for the three sets of team member-ratings completed for each participant. Interrater agreement was estimated for each team by calculating $r_{\text{within-group}}$ (r_{wg}) coefficients using a uniform null distribution, which assumes no systematic bias (James, Demaree, & Wolf, 1984). Each r_{wg} coefficient

indicates the percent reduction in observed variance relative to the variance that would have occurred had participants responded at random. For instance, the r_{wg} of .72 for the Contractor indicates a 72% reduction. For the team member-ratings, the r_{wg} averages across 38 teams were as follows: Contractor (.72), Creator (.70), Contributor (.85), Completer (.73), Critic (.51), Communicator (.89), and Calibrator (.66). Interrater agreement was then calculated in the same manner using all four sets of ratings per individual (i.e., one self, three team member). The resulting r_{wg} averages were: Contractor (.63), Creator (.67), Contributor (.88), Completer (.60), Critic (.72), Communicator (.45), and Calibrator (.80). Thus, incorporating the self-rating in the computation only increased the r_{wg} average for the Contributor, Critic, and Calibrator roles, and the r_{wg} for the Communicator decreased considerably from .89 to .45.

To assign informal roles to individuals, the four sets of ratings (i.e., one self, three team member) were combined for each individual. First, the average three-item scale rating for each informal role was averaged across the four raters in order to create an overall mean score for performance on that particular role. If the overall mean informal role score met or exceeded 4.00 (i.e., “to a great extent”), that particular informal role was coded as “performed.” Conversely, if an overall informal role score fell below 4.00, the role was coded as “not performed.” For example, a hypothetical participant rated herself on the three items associated with the Contractor scale, resulting in an average scale rating of 3.33. Each of her three team members also rated her along the same three items, resulting in average scale ratings of 5.00, 4.67, and 3.67. The overall informal role score average across the four raters’ average scale ratings was accordingly 4.17. Thus, because 4.17 is greater than 4.00, the Contractor role was coded as “performed” for the

hypothetical participant. In this way, each individual received a set of seven dichotomously coded informal role scores.

Informal Role Configuration

An IRC represents the number of individuals performing various roles within a team. In the present study, vectors were used to operationalize IRC by identifying the number of individuals performing each of seven roles within a team. Information for each team's IRC vector was compiled in the tool found in Appendix D. Each vector consists of a 7-digit numerical code to describe each team's role configuration. The code is read from left to right where each digit's location in the sequence corresponds to a specific informal role and the digit's numerical value represents the number of team members performing the role. The order of the informal role sequence is as follows: (a) Contractor, (b) Creator, (c) Contributor, (d) Completer, (e) Critic, (f) Communicator, and (g) Calibrator. Because the present study holds team size constant at four members per team, vectors can range from 0000000 (i.e., no one on the team performed any of the seven roles) to 4444444 (i.e., all four team members each performed all seven roles). The primary advantage of vectors is that, at a glance, they identify all roles performed, the number of individuals performing each role, and all roles not performed. Further, as in the case with the team balance hypothesis (Hypothesis 1e), vectors can be used to determine roles performed by *at least* one team member.

Team Effectiveness

Team effectiveness was measured via a team's total profit for each decision period. Specifically, team effectiveness was measured objectively using algorithms from the Tinsel Town (Devine et al., 2004) simulation. The revenue generated by each film (i.e., the product of the number of movie viewers and the average ticket price) was dependent upon the marketing level selected. That is, teams chose to produce films at specific marketing levels, and each marketing level had a revenue value associated with it that was unknown to the participants. The profit for each movie produced was calculated by subtracting the cost to produce a film (i.e., the sum of production costs and marketing costs) from the revenue generated. To determine the total profit, the profits from each film produced were summed *within* each of the two decision periods. Next, a profit score for each decision period was calculated by dividing the total profit obtained by the highest possible profit for the simulation (i.e., the profit generated by the ideal set of films with the optimal marketing strategy). The resulting proportion was multiplied by 100 to yield a percentage called a team effectiveness score. This process generated two team effectiveness scores — one for each decision period. As a final step, the team effectiveness scores from the two decision periods were averaged to determine overall team effectiveness.

Background Measures

In addition to the focal measures described above, demographic variables were collected (see Appendix C). Information on gender, ethnicity, age, total college credit hours completed, and cumulative university GPA was collected to characterize the

composition of the sample. Given that the target population of this study is work teams, participants were also asked how many hours per week they currently worked and if they had work team experience. The purpose of collecting the background measures was to characterize the nature of the sample for comparison purposes should future replications or extensions of the present study be conducted.

2.5. Procedure

To participate in the study, the majority of student volunteers accessed the Psychology Department's online student subject pool, while about 20% signed up by accessing an online sign-up site created by the experimenter. With regard to the online student subject pool, this study and others appeared on the website with a brief study narrative describing the characteristics and time duration of the study. If interested, students could choose to volunteer as a participant for a specific session in a specific room on campus.

At their respective sessions, participants first received a personality measure and a background measure and were instructed to complete both measures to the best of their abilities. Upon completing the initial measures, participants were assigned participant and team numbers and asked to write the numbers on the top of their personality and background measures. The experimenter then divided the participants into four-person teams and separated the teams by placing them in different private rooms.

Once in their rooms, teams were then read the instructions for the Tinsel Town (Devine et al., 2004) task (see Appendix B) and the four folders were randomly distributed containing information specific to each vice-president position. Teams then

commenced a 15-minute silent study period in which each participant privately reviewed the information in his/her folder. After the 15-minute silent period ended, participants were given 25 minutes to decide which films they wished to produce and how much to spend marketing each one. When 5 minutes remained in the first decision period, if teams had not finished, teams were given a verbal warning of the time remaining. About 25% of teams completed the task by the 5-minute warning. After the teams completed the first decision period, the experimenter calculated the percentage of total possible profit that each team achieved and the percentage of the total profit relative to the total possible for the decision period. Then, teams were given 5 minutes to review their performance feedback.

For the second decision period, each team member was assigned the same vice-president position as the first decision period, and four new folders were handed out to team members containing information on 11 new films. In addition, participants were told that they could use the information provided in the folder from the first decision period. Participants were then given another 15-minute silent period to privately review the information in their folders. Once the silent period ended, teams began a second 25-minute decision period. Like the first period, teams received a verbal warning with 5 minutes remaining if they had not yet completed the task. After the end of the second decision period, the experimenter once again provided performance feedback.

After reviewing the performance feedback for 5 minutes, the modified TRP (Mumford et al., 2006) self-report rating measure and three team member-rating measures were distributed to each team member. In front of each participant, the experimenter placed a folded note card with the participant's identification number. Each

participant was instructed to complete the self-report TRP as well as rate each of his/her three team members using the team member TRP forms. The experimenter reminded participants to identify team members through their participant numbers and not by name. Upon completion of the measures, the experimenter passed out a final debriefing statement (see Appendix E) that described the purpose of the study and provided the name and contact information of the principal investigator and experimenter. In total, each experiment session lasted approximately 2 hours.

2.6. Statistical Analyses

Prior to testing the hypothesized relationships, data were screened using a three-step process. First, two team outliers on the team effectiveness variables were removed from the team-level analyses. These teams were removed because their values fell below the a priori cutoff value of 40% of the maximum overall profit for at least one of the decision periods. It was assumed that scores below 40% were suggestive of random guessing. Implementing the cutoff resulted in the removal of eight participants from the individual-level analyses, which reduced the total sample of participants from 160 to 152 and the total number of teams from 40 to 38.

Next, as recommended by Roth, Switzer, and Switzer (1999), missing data were imputed by substituting a person's mean response to other items from the same multiple-item scale in which the missing data point occurred. For the personality measure, missing data points were replaced with the average of an individual's ratings on the completed items from the 10-item dimension subscale where the missing data point occurred. In total for the personality measure, data were imputed for seven missing data points across

five participants, where three participants had a single data point missing from one subscale and two had a single data point missing from two separate subscales. For the informal role measure, missing data points for an individual were replaced with the average of the four raters' (i.e., one self, three team members) completed 3-item scale ratings for the informal role scale in which the missing data point occurred. Data were imputed for 17 total missing data points from five participants' informal role performance data, where three participants had missing data points on a single scale, one had missing data points on two scales, and one had missing data points on three scales. The participants with missing data on the personality measure were not the same as those with missing data on the informal roles measure.

Finally, continuous variables were tested for normality by comparing the skewness and kurtosis values to the suggested limits of +/- 1.00 (Meyers, Gamst, & Guarino, 2006). No transformations were made for individual-level continuous variables (i.e., Big Five personality dimensions) because all values fell within the accepted limits. As for the team-level continuous variables (i.e., number of individuals performing each role, total roles performed, team balance, team effectiveness), the decision was made to forgo data transformations for two reasons. First, only the variables associated with team balance and the number of individuals performing the Calibrator role exceeded the accepted skewness and/or kurtosis values by more than a margin of .20. Second, for ease of subsequent data interpretation, transformations were avoided on those variables.

With regard to the statistical analyses, all hypotheses were tested for statistical significance using two-tailed tests and alpha levels of $p < .05$. Results were considered to approach significance if the test for significance was at or below the .10 level but greater

than or equal to .05. Exact p -values were reported for all cases, except those less than .01; for those exceptions, $p < .01$ was reported. Next, the means, standard deviations, and intercorrelations for focal individual-level and team-level variables were calculated. The resulting intercorrelation between the first decision period and second decision period team effectiveness scores (i.e., percentage of the maximum profits possible) was not statistically significant ($r = .21, p = .20$). Because of the small nonsignificant relationship, it was deemed inappropriate to calculate an overall mean team effectiveness. For this reason, team-level hypotheses were tested separately for the team effectiveness scores resulting from the first (i.e., TE1) and second (i.e., TE2) decision periods.

For the two team-level hypotheses categories (i.e., linear, interaction), different operationalizations of IRC served as the independent variables and the TE1 and TE2 served as dependent variables. Linear category hypotheses were all tested using Pearson correlations. The interaction category hypothesis (i.e., Hypothesis 2) was assessed using hierarchical multiple regression. First, the two independent variables (i.e., Creator, Critic) were centered and an interaction term was created from the two centered independent variables. In step one, the two centered predictors were entered, and then in step two, the centered interaction term was entered. To determine if the interaction was significant, the second step of the regression was checked for a statistically significant increase in the total variance explained.

To identify an optimal IRC vector in relation to TE1 and TE2, two criterion profile analyses were conducted, one for each team effectiveness variable. There are two underlying purposes of a criterion profile analysis: (a) to identify a pattern of predictor scores corresponding to high criterion scores and (b) to determine the amount of variation

in the criterion scores explained by the identified pattern of predictor scores (Davison & Davenport, 2002). Before describing the steps in a criterion profile analysis, however, it is important to distinguish between two important key terms. First, in the context of the present study, a *profile pattern* refers to the number of individuals performing each role in a single team's IRC vector (see Figure 2 for a sample profile pattern). A *criterion pattern*, on the other hand, is an optimal configuration of informal roles associated with high levels of team effectiveness (See Figure 3 for a sample criterion pattern). A criterion pattern differs from a pattern profile in that its pattern is associated with high criterion scores. Accordingly, the criterion pattern scores are symbolic of the relative weight or importance of each informal role in relation to high team effectiveness.

To statistically derive an optimal criterion pattern, multiple regression was used. First, each team effectiveness variable was regressed onto the seven informal role variables representing the number of individuals performing each role within teams. This process yielded seven unstandardized regression coefficients associated with each informal role, where each team effectiveness variable included a unique set of coefficients (see Table 9). Second, for each team effectiveness variable, the average of the seven unstandardized regression coefficients was subtracted from each variable's unstandardized regression coefficient to obtain a series of criterion pattern scores that together represent criterion patterns (see Figure 4 and Figure 5).

Next, the level effect and pattern effect variables were created in order to test the extent to which the criterion pattern explained variation in its respective team effectiveness variable. On one hand, the *level effect* refers to the within-team average number of individuals performing each of the seven informal roles. For instance, using

the sample profile pattern from Figure 2, the level effect is equal to 2.00 (i.e., $[2 + 4 + 3 + 1 + 0 + 2 + 2] / 7 = 2.00$). The *pattern effect*, on the other hand, refers to the covariance between the number of individuals performing each role in a single team (i.e., profile pattern) and the corresponding criterion pattern scores associated with a particular team effectiveness variable (i.e., TE1, TE2). In this way, a level effect and a pattern effect is calculated for each team.

As a final step, two sets of hierarchical multiple regressions were conducted to evaluate the relative amount of variance explained in each team effectiveness variable by the level effect and corresponding pattern effect, where each set consisted of a regression for TE1 and another for TE2. In the first set of hierarchical regressions, one of the team effectiveness variables was entered as the dependent variable, the pattern effect was entered in the first step, and the level effect was entered in the second step. The variance explained in the first step indicated whether the pattern effect associated with the team effectiveness variable explained a significant amount of variance in the team effectiveness variable. The amount of incremental variance explained by the level effect in the second step indicated the strength of the pattern effect. Ideally, the level effect should not explain a significant amount of incremental variance in the team effectiveness variable beyond that of the pattern effect entered in the first step. In the second set of hierarchical regressions, one of the team effectiveness variables was entered as the dependent variable, the level effect was entered in the first step, and the pattern effect was entered in the second step. The purpose for these regressions was to determine whether the pattern effect entered in step two explained incremental variance above the variance explained by the level effect in step one. Like the first set of hierarchical

regressions, the second set tested the strength of the pattern effect and, consequently, the identified criterion pattern for each team effectiveness variable.

Lastly, the individual-level hypotheses were tested using point-biserial correlations, where a specific Big Five dimension served as the independent variable and a dichotomously coded informal role performance score served as the dependent variable.

CHAPTER 3. RESULTS

3.1. Preliminary Analyses

Team-level intercorrelations, means, and standard deviations are presented in Table 2. Individual-level intercorrelations, means, and standard deviations are presented in Table 3. Correlations achieving statistical significance are marked with asterisks indicating the level of significance.

With regard to the team level, the informal roles and team effectiveness variables were examined for evidence of convergent and divergent validity. Correlations between informal roles from the task role category (i.e., Contractor, Creator, Contributor, Completer, Critic) were all statistically significant at $p < .01$ and ranged from $r = .42$ for the number of Contractor and Contributor roles performed within a team to $r = .82$ for the number of Contributors and Critics performed within a team. These strong and significant correlations indicate convergent validity between informal roles from the task role category. As for the social role category, the number of Communicator and Calibrator roles within a team did not result in a significant correlation ($r = .17, p = .32$) and, thus, little convergence was found between the two informal roles in this category. Finally, as mentioned previously, the correlation between the first and second decision period team effectiveness variables was lower than expected ($r = .21, p = .20$), indicating low convergent validity.

Concerning divergent validity, correlations between the Calibrator role from the social role category and informal roles from the task role category were all significant at $p < .01$, and they ranged from $r = .45$ for the number of Completer and Calibrator roles to $r = .67$ for the number of Creator and Calibrator roles. Thus, the number of Calibrators within a team showed more convergence with the number of informal roles from the task role category than with the number of Communicator roles from the same social role category. Similarly, with respect to the relationship between the Communicator role and informal roles from the task role category, only the correlation between numbers of Communicator and Contractor roles ($r = .08, p = .64$) failed to reach at least marginal significance level of $p \leq .10$.

Regarding the individual-level variables, the Big Five personality variables and informal role performance variables were also assessed for convergent and divergent validity. Between dimensions of the Big Five, 6 of the 10 possible unique intercorrelations were found to be statistically significant, and the 10 positive intercorrelations ranged in magnitude from $r = .02$ ($p = .78$) for the Conscientiousness and Openness to Experience relationship to $r = .32$ ($p < .01$) for the Conscientiousness and Emotional Stability relationship. Because the correlations were small to moderate in magnitude, some evidence was found for divergent validity between dimensions.

Correlations between individual-level informal roles from the task role category were all significant at $p < .01$ and ranged from $r = .36$ for the Contractor-Critic relationship to $r = .67$ for the Contributor-Critic relationship. Thus, within the task role category, convergence was found between informal roles. As for the social role category,

the Communicator-Calibrator intercorrelation was nonsignificant ($r = .15, p = .06$), thus, indicating little convergence between roles from this category.

The individual-level correlations between informal roles from the task and social role categories were all significant, except the Contractor-Communicator relationship ($r = .08, p = .30$). The significant intercorrelations ranged from $r = .17 (p = .04)$ for the Critic-Communicator relationship to $r = .48 (p < .01)$ for the Creator-Calibrator relationship. As such, informal roles from the task role category tended, for the most part, to demonstrate some level of convergence with informal roles from the social role category.

In general, the means, variability, and ranges of team- and individual-level variables were relatively normal. With that said, the number of Calibrator roles performed within a team had a relatively small mean of .26 from a possible range of .00 to 4.00. Similarly at the individual level, the Calibrator role had a mean of .07 on a dichotomous coding scheme, where .00 indicates the role was not performed and 1.00 indicates the role was performed. This signifies that the Calibrator role was rarely performed by individuals and, consequently, the informal role rarely occurred within IRC. As a result, the Calibrator role had relatively low variability at the individual level ($SD = .25$) and at the team level ($SD = .86$) when compared with the other informal role and IRC variables, respectively.

3.2. Hypotheses Tests

Team-Level Hypotheses

The hypotheses in the linear category predicted linear relationships between one or more informal roles in an IRC and team effectiveness. Hypotheses 1a and 1b predicted significant main effects for the number of Creator and Communicator roles based on prior research (Chong, 2007). As evidenced by Table 2, the relationships between the Creator and the first decision period (TE1) and second decision period (TE2) team effectiveness scores were both nonsignificant ($r = .21, p = .21$ and $r = -.13, p = .43$, respectively). Similarly, the correlations between the Communicator and TE1 ($r = .09, p = .57$) and TE2 ($r = -.05, p = .78$) failed to reach significance. Thus, Hypotheses 1a and 1b were not supported. Hypothesis 1c was an exploratory hypothesis in which a significant, positive relationship was predicted between the number of Completer roles performed and the level of team effectiveness. The correlation between Completer and TE1 was medium-to-large in size and reached statistical significance ($r = .37, p = .02$); however, the correlation between the Completer and TE2 failed to reach statistical significance ($r = .04, p = .83$). Therefore, Hypothesis 1c received partial support. For Hypothesis 1d, a significant positive relationship was predicted for the total number of roles performed within a team and the level of team effectiveness. The association between total roles performed and TE1 approached statistical significance ($r = .27, p = .10$), while the relationship between the same independent variable and TE2 was nonsignificant ($r = -.07, p = .66$). Finally, Hypothesis 1e predicted a significant, positive relationship between the extent to which a team was balanced (i.e., the number of

informal roles filled by at least one individual) and team effectiveness. The relationships between team balance and TE1 ($r = .22, p = .19$) and TE2 ($r = -.18, p = .28$) failed to reach significance and, thus, no support was found for Hypothesis 1e.

Hypothesis 2 predicted an interaction between the number of Creator and Critic roles performed in relation to team effectiveness, such that the relationship would be significantly stronger than the main effects of the two informal roles combined additively (see Table 4). Specifically, the form of interaction between the Creator and Critic roles was expected to have a larger positive slope in relation to team effectiveness than the additive model of the main effects. This hypothesis was not supported as the interaction term failed to explain significant incremental variance above that of the two main effects when entered in the second step of the hierarchical regression for TE1 ($\Delta R^2 = .01, p = .48$) and TE2 ($\Delta R^2 = .00, p = 1.00$). For a results summary of all team-level hypotheses, please refer to Table 5 and Table 6.

Individual-Level Hypotheses

The individual-level hypotheses predicted significant relationships between specific dimensions of the Big Five and informal roles (see Table 3). Hypotheses 3a and 3b predicted positive associations between the Big Five dimension of Agreeableness and the informal roles of Communicator and Calibrator, respectively. The test of Hypothesis 3a resulted in a statistically significant medium-sized correlation between Agreeableness and Communicator ($r = .24, p < .01$) and, therefore, it was supported. Hypothesis 3b was not supported as it failed to reach significance ($r = .11, p = .16$).

Hypotheses 4a through 4e predicted positive relationships between Conscientiousness and the informal roles falling within the task role category (i.e., Contractor, Creator, Contributor, Completer, Critic). With regard to Hypothesis 4a, a small correlation was found between Conscientiousness and the Contractor role that approached statistical significance ($r = .15, p = .10$). The remaining hypothesized relationships between Conscientiousness and the four corresponding informal roles were as follows: Creator ($r = .09, p = .28$), Contributor ($r = .12, p = .14$), Completer ($r = .13, p = .12$), and Critic ($r = .00, p = .98$). Therefore, Hypotheses 4b through 4e were not supported.

For Hypotheses 5a through 5e, the Big Five dimension of Openness to Experience was predicted to share a negative relationship with informal roles associated with the task role category. All five hypotheses were not supported. In fact, Hypothesis 5c predicted a negative association between Openness to Experience and the Contributor role, and contrary to the predicted direction of the relationship, a significant *positive* correlation was found ($r = .20, p = .02$). The nonsignificant relationships between Openness to Experience and the four remaining task roles were as follows: Contractor ($r = .07, p = .42$), Creator ($r = .08, p = .36$), Completer ($r = .10, p = .20$), and Critic ($r = .10, p = .23$).

Hypotheses 6a through 6e predicted Extraversion would be negatively related to a person's adoption of informal roles associated with the task role category. Again, no support was found for these five hypotheses. On one hand, Hypotheses 6a and 6b were not supported because the relationships between Extraversion and the Contractor ($r = .11, p = .19$) and Creator ($r = .11, p = .19$) roles failed to reach statistical significance. On the

other hand, the tests for Hypotheses 6c, 6d, and 6e reached statistical significance — albeit in the opposite direction as originally predicted. For Hypothesis 6c, 6d, and 6e, Extraversion demonstrated a positive correlation between the following roles: Contributor ($r = .27, p < .01$), Completer ($r = .21, p < .01$), and Critic ($r = .20, p = .01$). For a results summary of all individual-level hypotheses, please refer to Table 7.

3.3. Follow-Up Analyses

Follow-up analyses were conducted for two purposes: (a) to address the low correlation between TE1 and TE2, (b) to identify optimal IRC vectors for TE1 and TE2. First, given the small nonsignificant intercorrelation between TE1 and TE2 ($r = .21, p = .20$) and the possibility of a feedback effect between the two decision periods, the team-level correlations between the IRC variables and TE2 were re-analyzed while controlling for TE1. As indicated by Table 8, the correlations were all negative when the effects of TE1 were controlled. In fact, all correlations were pulled further toward the negative value of $r = -1.00$ when compared to the original TE2 variable. In contrast, all correlations with TE1 were positive.

The second purpose of the follow-up analyses was to identify optimal IRC vectors based on statistically derived criterion patterns for TE1 and TE2, respectively. To do so, two criterion patterns (see Figure 4 and Figure 5) were derived from unstandardized regression coefficients (see Table 9). Figure 4 displays the criterion pattern associated with TE1 in which the criterion pattern score for a particular informal role indicates the ideal relative frequency of that informal role in relation to the frequency of the other informal roles. Thus, the criterion pattern for TE1 indicates that highly effective teams

had a larger number of individuals performing the Completer role relative to other informal roles because its criterion pattern score is by far the greatest (4.45). To a lesser extent, the criterion pattern scores for the Critic and Calibrator roles (1.34 and 2.03, respectively) indicate their positive impact on TE1. Conversely, negative criterion pattern scores for the Contractor (-2.41), Creator (-2.00), Contributor (-1.45), and Communicator (-1.94) roles suggest that larger frequencies of these informal roles were not associated with higher levels of TE1. With regard to the criterion pattern for TE2 displayed in Figure 5, the positive criterion pattern scores correspond to the same three informal roles as the criterion pattern for TE1. However, for TE2 the criterion pattern score for the Calibrator role is the largest (10.34) when compared to the Completer and Critic roles (5.07 and .48, respectively). Thus, teams with larger numbers of individuals performing the Calibrator role relative to other informal roles tended to achieve higher levels of TE2.

Next, to determine the adequacy of the two criterion patterns, two hierarchical multiple regression statistical tests were conducted for TE1 and TE2. In the first regression, it was necessary to determine whether the pattern effects explained a significant amount of the variance in their respective team effectiveness variable (see first step in Table 10). With respect to TE1, the level effect explained a significant portion of TE1 variance ($R^2 = .13, p = .02$). As for the pattern effect associated with TE2, the criterion pattern also explained a significant amount of the variance in TE2 ($R^2 = .26, p < .01$). Next, it was investigated whether the level effect would add a significant amount of incremental variance above the variance already explained by the pattern effect. Results from each team effectiveness variable's respective hierarchical multiple regression (see Table 10) revealed that when the level effect was entered in the second step, it did not

explain significant incremental variance over the pattern effect entered in the first step for TE1 ($\Delta R^2 = .06, p = .12$) and TE2 ($\Delta R^2 = .01, p = .56$). Finally, it was tested whether the pattern effect would add significant incremental variance over the level effect. Again, two hierarchical multiple regressions were conducted for TE1 and TE2 (see Table 11). When entered in the second step, the pattern effect explained a significant portion of additional variance beyond the level effect entered in the first step for TE1 ($\Delta R^2 = .12, p = .03$) and TE2 ($R^2 = .26, p < .01$). Together, these three statistical tests lend further support to the criterion-related validity of the optimal criterion patterns identified for TE1 and TE2; although, the variance explained was considerably larger for the latter.

CHAPTER 4. DISCUSSION

The primary goals of this study were to investigate the links between: (a) team-level IRC and team effectiveness and (b) individual-level personality and informal roles. With respect to the first goal, it was found that more individuals performing the Completer role resulted in greater team effectiveness for the first of two decision-making periods (i.e., support for Hypothesis 1c). In addition, the total number of informal roles performed within a team was found to be positively and marginally associated with team effectiveness in the first decision-making period (i.e., Hypothesis 1d). Support was not found for any of the other predicted relationships, but follow-up analyses did reveal some promising findings. By conducting follow-up exploratory analyses, two optimal criterion patterns were identified that corresponded to high levels of their respective team effectiveness variable. Each criterion pattern represented the ideal relative frequency of each informal role within an IRC in relation to high levels of team effectiveness. In terms of criterion-related and incremental validity, the two pattern effects explained significant amounts of variance in their respective team effectiveness variable and, moreover, they explained significant amounts of incremental variance beyond those of their corresponding pattern effects (i.e., the mean number of individuals performing each role within a team).

With regard to the second goal of the present study, limited support was found for the relationships between specific dimensions of the Big Five and the adoption of informal roles. In terms of the hypothesized relationships, only an individual's level of Agreeableness was found to be positively associated with the likelihood that he/she adopted the Communicator role. In addition, a marginally significant positive relationship was found between a person's level of Conscientiousness and his/her adoption of the Contractor role. Contrary to Stewart et al.'s (2005) findings, Openness to Experience *positively* and significantly correlated with the Contributor role, whereas the hypothesized relationship was in the opposite direction. Likewise, Extraversion significantly correlated with the Contributor, Completer, and Critic roles — all of which were of similar magnitude and in the positive direction instead of the hypothesized negative direction.

Overall, the results of this study provided only limited support for the conceptual model adapted from Stewart et al. (see Figure 1). At the team level, only one hypothesis was supported, while marginal support was found for another; furthermore, this support was limited to only the first decision period team effectiveness variable. Follow-up analyses, however, identified two criterion patterns with relatively similar patterns that each explained a significant amount of variance in its corresponding team effectiveness variable. At the individual level, again, full support was found for only one hypothesis, and marginal support was found for another. Four additional significant relationships were found at the individual level despite being in the opposite direction of the original hypotheses. Thus, despite the limited support for the hypothesized relationships, the study did yield some promising findings with respect to Stewart et al.'s conceptual model.

4.1. Contributions

Theoretical Contributions to the Literature

The design and results of this study offer several unique contributions to the existing literature. To begin with, past research has explored the proposed link between IRC and team effectiveness (e.g., Blenkinsop & Maddison, 2007; Chong, 2007; Partington & Harris, 1999; Prichard & Stanton, 1999; Senior, 1997; Stewart et al., 2005; van der Water et al., 2008). The reviewed studies all used Belbin's (1981, 1993) informal role taxonomy, while the present study was the first to use roles conceptualized in accord with Mumford et al.'s (2006) integrative taxonomy to investigate the link between IRC and team effectiveness.

With regard to the link between IRC and team effectiveness, the present study tested an IRC vector conceptualization inspired by Belbin's (1981, 1993) theory of balanced teams. Past researchers have tested variations of Belbin's balanced team theory that proposes successful teams will have one person filling each informal role, and most have found limited to no support for the relationship between "balanced" teams and team effectiveness (i.e., Blenkinsop & Maddison, 2007; Partington & Harris, 1999; Senior, 1997; van der Water et al., 2008). Despite past null findings, the present study investigated Belbin's theory of balance once more, however, this time using informal roles from Mumford et al.'s (2006) taxonomy. Consistent with prior findings, a nonsignificant relationship was found between the number of informal roles adopted by at least one individual and the level of team effectiveness achieved. Thus, even with a new and integrative informal role taxonomy, Belbin's theory of balanced teams received

no additional support. One possible explanation for the lack of support is as follows: Because informal roles are context specific, some informal roles may provide more or less benefit depending on the nature of a team's work and objectives. That is, a particular informal role may be essential in some contexts and unnecessary others. Accordingly, the concept of team "balance" may vary from context to context as well and, therefore, it should be defined within a specific context of interest and not overgeneralized.

In contrast to team balance, the total number of informal roles performed within a team yielded a marginally significant relationship with team effectiveness in the first decision period. Intuitively, this finding seems logical and expected given that Mumford et al. (2006) made a conscious decision to include only functional roles in their integrated taxonomy. The finding suggests that the behavior patterns associated with the roles may have a linear and positive impact on team effectiveness. With that said, the lack of full support for this relationship may be due to the varying degree of influence on team effectiveness associated with specific informal roles from an IRC. Based on criterion-related validities, the criterion profile analysis approach discussed in the following paragraph may offer a better method for operationalizing IRC than simply summing the total number of roles performed.

Another notable contribution of the present study stems from the follow-up criterion profile analyses conducted. To date, no studies have used this exploratory approach to identify optimal IRC vectors (i.e., criterion patterns) in relation to team effectiveness. Because team effectiveness was assessed for two decision periods, a criterion pattern was statistically derived for each. The multiple regression-based results, confirmed that, in fact, an optimal team predictor pattern does exist for each criterion. In

addition, both criterion patterns (see Figures 3 and 4) revealed similar shapes and structures. For instance, in both criterion patterns, the Completer, Critic, and Calibrator roles had criterion pattern scores greater than zero, while the remaining roles had negative scores. Although criterion patterns scores do not indicate the specific number of individuals that perform each role in highly effective teams, they do indicate the relative frequency of informal roles performed within highly effect teams. Therefore, as evidenced by the criterion pattern scores, the identified criterion patterns suggest that a team should ideally contain multiple individuals performing the Completer, Critic, and Calibrator roles and fewer individuals performing the remaining roles. With that said, the identified criterion patterns should be cross-validated in other samples to determine their generalizability across tasks (Davison & Davenport, 2002). As mentioned previously, highly effective IRC likely vary from context to context.

In the present study, limited support was found for the notion that the number of individuals adopting specific informal roles influences team effectiveness, regardless of the other roles adopted within a team. Although the results failed to replicate the findings of Chong (2007), a rather strong main effect for the Completer role was found in relation to team effectiveness in the first decision period. As such, it appears that the cluster of related behaviors associated with the Completer role is, to some extent, important to achieve higher levels of team effectiveness. Of course, caution should be taken when attempting to generalize this finding, as the significant relationship could be an artifact of the nature of the decision-making task used. In addition, the relationship was only significant in relation to the first decision period team effectiveness variables and not the second.

Like the theoretical team-level link, in terms of hypothesized relationships, the present study contributed little support to the individual-level link between personality and informal roles. However, the specific relationships tested are unique to this study. Few studies have assessed the relationship between dimensions of the Big Five and informal role performance (i.e., Blumberg, 2001; Mumford et al., 2008; Stewart et al., 2005), and of these studies, none have addressed the relationship between the Big Five and *specific* informal roles. Rather, past studies considered only role categories (e.g., task, social) and not the informal roles associated with them. Therefore, by assessing the relationships between the Big Five dimensions and seven of Mumford et al.'s informal roles, the present study makes a valuable contribution to the literature. That is, testing the relationships at a more specific level results in a more descriptive and specific account of the informal role behavior clusters with which the Big Five dimensions tend to correlate.

With regard to the hypothesized relationships between the Big Five and informal roles, one hypothesis was fully supported and another was marginally supported. The association between a person's level of Agreeableness and his/her adoption of the Communicator role was found to be significant in the expected direction. The hypothesized relationship between Conscientiousness and the Contractor role, on the other hand, only approached significance. Despite the nonsignificance of all other hypothesized individual-level relationships, some unexpected relationships did emerge. Although in the opposite direction as predicted, the relationships between Extraversion and the Contributor, Completer, and Critic roles were all positive, significant, and small to moderate in size. Similarly, Openness to Experience resulted in a small, positive, and significant relationship as well as yielding a correlation in the opposite direction of the

original hypothesis. In summary, the hypothesized relationships between the Big Five and specific informal roles were largely unsupported but some unexpected relationships were found. Therefore, more research is needed to investigate the individual link between the Big Five and Mumford et al.'s (2006) informal roles.

Practical Implications

The results of this study lend themselves to several practical applications related to organizational selection and employee development. With respect to organizational selection, the IRC of existing workplace teams could be assessed to identify teams with IRC that mirror the optimal criterion patterns. However, because the criterion patterns in the present study were identified in a specific context, it is not clear if the same criterion patterns could be used to identify highly effective teams in other contexts. Therefore, I suggest that organizations conduct their own analyses to determine criterion patterns that reflect their own work contexts and team effectiveness criteria. In this way, organizations could select teams with IRC that closely resemble an identified criterion pattern to carry out their most important projects.

The results of the present study also yield practical implications for selecting individuals for work teams. Although in the opposite direction of the predicted relationship, individuals high in the personality dimension of Extraversion tended to adopt the Completer role. Furthermore, teams consisting of more individuals performing the Completer tended to have greater team effectiveness. Therefore, it may be wise for organizations to select a larger number of team members high in Extraversion with the expectation that such individuals will be more likely to adopt the Completer role. With

that said, implementing such a practice should be done with caution because a specific team decision-making context was used in the present study. As mentioned above, it remains to be seen whether the results of the present study will generalize to other teams working in different contexts and carrying out different tasks.

In terms of employee development, the findings of the present study have potential applications for training. Although Mumford et al. (2006) described their taxonomy roles as functional, findings from the present study indicate that greater representation of some informal roles within IRC positively correlate with team effectiveness. Namely, regardless of the other informal roles performed, the number of individuals filling the Completer role demonstrated a moderate-to-large relationship with a team's level of effectiveness in the first decision period. In support of this, both criterion patterns identified in this study indicated that effective teams had IRC with more Completers, Calibrators, and to a lesser extent, Critics. I suggest, however, that organizations first define team effectiveness in accordance with their organizational context and then conduct their own analyses to determine the specific informal roles or the configuration of informal roles that are most likely to yield high levels of team effectiveness. In doing so, organizations could train employees to focus on performing behaviors associated with highly effective IRC. For example, if like the present study, IRC consisting of more Completers, Calibrators, and Critics were found to coincide with high team effectiveness, employees could be trained to engage in behaviors related to those three roles. In fact, more attention and emphasis could be placed on those informal role behaviors associated with higher criterion pattern scores. In this way, employees

could perform critical behaviors with greater frequency relative to other less essential behaviors.

4.2. Limitations and Future Research

As with any empirical study, limitations are inevitable, and the present study has several notable ones. First, the relatively small sample size at the team level decreased the power to detect significant findings should they have actually existed. This was evidenced by the fact that some hypothesized relationships failed to reach statistical significance even though the magnitude of the effect sizes were medium in magnitude. With a larger sample, those relationships may have reached significance. Efforts were made to maximize the total sample by sending reminder emails to increase participant attendance and scheduling sessions in the evenings and on weekends to accommodate those students with full-time work commitments. Unfortunately, low attendance rates persisted throughout data collection, resulting in a less than desirable team-level sample size.

The type of sample used in the current study served as an additional limitation. Even though approximately 77% of the sample had prior work team experience, the student participants may not have experienced the same level of motivation as they would have in a real work context. Because there was no financial reward for performing well (other than the simulated profits generated in the decision-making tasks), students may have exerted less effort. Future research should consider conducting a similar study in a field setting with real work teams. In addition, a similar lab study should be conducted that offers a tangible reward to participants in order to increase motivation.

Also of importance, the present study controlled for team type by limiting team interactions to a single type of decision-making task. Therefore, when interpreting the results, it is important to consider the context in which the team members interacted. Similarly, some might argue that the Tinsel Town simulation does not demonstrate high levels of fidelity with real world team decision-making scenarios and, as a result, the results may lack certain degree of generalizability. With these limitations in mind, future research should attempt to replicate the findings of the present study in a variety of contexts in both lab and field settings.

Controlling for team size acted as a double-edged sword in the present study. On one side, controlling team size should be considered a strength because it eliminated what could have been a possible confound — variations in team size. On the other side, controlling team size may have narrowed the scope of generalizability for the present study. It is entirely possible that some findings will not generalize to teams with more than or fewer than four members. Specifically, teams with more than four team members may face different constraints when exchanging information and reaching decisions. For instance, a large team size may complicate the decision-making process because more sources of unique information are available. Consequently, compared to a four-person team, different informal roles may be required to sift through and weigh the numerous decision-making alternatives as well as quell the onset of displeasure as more and more team members' ideas are rejected. Therefore, the findings of the present study should be replicated with a variety of team sizes.

Another limitation of the present study stems from the relatively short amount of time team members interacted with one another. The small window of interaction may

not have afforded adequate time for team members to fully flesh out and adopt informal roles. Compared to other informal roles, a relatively small number of individuals adopted the Calibrator role. On one hand, this may indicate that there was not sufficient time for the behaviors associated with the role to manifest. On the other hand, the simulation itself may not have been conducive for such behaviors to emerge. Consequently, informal roles should be studied in situations where teams perform longer duration tasks; or, some sort of socioemotional conflict should be introduced into the simulation to ensure individuals have reasons and opportunities to perform the Calibrator role.

With regard to the team member ratings of informal role performance, the level of social cohesion amongst team members may have influenced the accuracy of their ratings. Specifically, highly cohesive teams may have provided more lenient ratings for their fellow team members and, thus, potentially skewing the results. At this point, the relationship between social cohesion and rating accuracy is purely conjecture. Nonetheless, I propose adding a measure of social cohesion to future replications of the present study to test for such a relationship.

Also related to ratings of informal role performance, for certain roles, the within team interrater agreement (r_{wg}) fell below the conventional cutoff of .70 for averaging ratings across raters (i.e., one self, three team member) for a particular target. The Contractor, Creator, and Completer roles fell within the r_{wg} range of .60 to .67, while the r_{wg} for the Communicator role was much lower at .45. These low interrater agreement values may indicate that raters differed in how they interpreted the anchors of the five-point frequency rating scale, or they may suggest that each rater recalled varying amounts of the target's behaviors. Either way, informal role performance may not have been

measured well. To address this issue, future research should videotape team interactions and instruct trained raters to rate team members using the informal role measure. The resulting ratings should then be compared with self and team member ratings to determine whether meaningful differences exist.

Finally, the first and second decision period team effectiveness variables did not significantly correlate. Based on the measurement similarities between the two variables, it was expected that they would share a strong and significant intercorrelation. It is possible that the feedback given between the first and second decision periods may have yielded learning or motivation effects. To test this, follow-up analyses were conducted that controlled for the effects of first decision period team effectiveness. The analyses indicated that the differences between the IRC variables and two team effectiveness variables became more pronounced when controlling for first decision period team effectiveness. One possible explanation is as follows: After receiving feedback, teams with high team effectiveness in the first decision period may have become collectively unmotivated to match or exceed their score in the second decision period. Conversely, teams receiving low team effectiveness feedback in the first decision may have become more motivated to improve in the second decision period. Future research using Tinsel Town is needed to investigate whether a feedback effect truly exists and, if so, what is the nature of the effect (e.g., learning, motivational).

4.3. Conclusion

Based on the Stewart et al. (2005) conceptual model, the present study investigated the team-level link between IRC and team effectiveness and the individual-

level link between personality and the adoption of informal roles. Based on the hypothesized relationships, limited support was found for the two links. However, follow-up analyses at the team-level and closer examination of individual-level intercorrelations yielded promising directions for future research. In particular, the criterion patterns identified in the present study should be cross-validated in future studies.

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- *Asterisks denote references cited only in Appendix A: Proposal Introduction.

TABLES

Table 1 Informal Roles from Past Taxonomies Used to Develop the Mumford et al. (2006) Taxonomy

		Previous Study								
		Mumford et al. (2006)	Benne & Sheats (1948)	Bales (1950)	Belbin (1993)	Ancona & Caldwell (1992)	McCann & Margerison (1995)	Barry (1991)	DuBrin (1995)	Parker (1996)
Task Roles	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		Concluder			Knowledge contributor	Contributor
	Critic	Evaluator-critic	Disagrees Shows tension Shows antagonism	Monitor evaluator		Controller	Reporter		Challenger	Challenger
Social Roles	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	
Boundary- Spanning Roles	Consul					Ambassador Guard				
	Coordinator			Resource investigator	Task coordinator Scout	Explorer	Spanning			

Note: Adapted from Mumford et al. (2006).

Table 2 Correlations between Team-Level Variables

	1	2	3	4	5	6	7	8	9	10	11
<i>k</i>	38	38	38	38	38	38	38	38	38	38	38
Mean	1.11	.95	1.68	1.55	1.18	3.03	.26	9.76	4.18	74.43	80.16
(SD)	(1.31)	(1.21)	(1.28)	(1.29)	(1.25)	(1.28)	(.86)	(6.43)	(1.93)	(11.90)	(16.41)
1. Contractors	1.00	.57**	.42**	.49**	.52**	.08	.55**	.68**	.57**	.09	-.21
2. Creators		1.00	.67**	.66*	.72**	.28	.67**	.86**	.78**	.21	-.13
3. Contributors			1.00	.65**	.82**	.40*	.47**	.84**	.75**	.22	-.07
4. Completers				1.00	.64**	.51**	.45**	.84**	.77**	.37*	.04
5. Critics					1.00	.30	.53**	.86**	.76**	.26	-.06
6. Communicators						1.00	.17	.53**	.49**	.09	-.05
7. Calibrators							1.00	.69**	.46**	.22	.16
8. Total Roles								1.00	.87**	.27	-.07
9. Team Balance									1.00	.22	-.18
10. TE1										1.00	.21
11. TE2											1.00

*Correlation is significant at the $p < .05$ (2-tailed) **Correlation is significant at $p < .01$ (2-tailed)

Key: k =number of teams; Total Roles=total number of informal roles performed within a team; Team Balance=number of distinct informal roles filled by at least one individual; TE1=first decision period team effectiveness (percentage of maximum possible profit score); TE2=second decision period team effectiveness (percentage of maximum possible profit score).

Table 3 Correlations between Individual-Level Variables

	1	2	3	4	5	6	7	8	9	10	11	12
<i>n</i>	152	152	152	152	152	152	152	152	152	152	152	152
Mean	4.15	3.25	3.68	3.76	3.27	.28	.24	.42	.39	.30	.76	.07
(SD)	(.55)	(.71)	(.66)	(.51)	(.73)	(.45)	(.43)	(.50)	(.49)	(.46)	(.43)	(.25)
1. Agreeableness	1.00	.14	.23**	.25**	.13	-.04	-.04	.09	.08	.11	.24**	.11
2. Emotional Stability		1.00	.32**	.23**	.29**	.02	.03	.14	.01	.05	.09	-.04
3. Conscientiousness			1.00	.02	.20*	.15	.09	.12	.13	.00	.15	-.04
4. Openness				1.00	.15	.07	.08	.20*	.10	.10	-.02	.03
5. Extraversion					1.00	.11	.11	.27**	.21**	.20*	.07	-.02
6. Contractor						1.00	.48**	.38**	.45**	.36**	.08	.42**
7. Creator							1.00	.50**	.44**	.49**	.21*	.48**
8. Contributor								1.00	.46**	.67**	.20*	.31**
9. Completer									1.00	.48**	.33**	.33**
10. Critic										1.00	.17*	.41**
11. Communicator											1.00	.15
12. Calibrator												1.00

*Correlation is significant at $p < .05$ (2-tailed) **Correlation is significant at $p < .01$ (2-tailed)

Key: n =sample size; Openness=Openness to Experience.

Table 4 Hierarchical Regression Analyses of Creator-Critic Interaction

Model/Predictor	TE1			TE2		
	β	R^2	ΔR^2	β	R^2	ΔR^2
<i>Step 1</i>		.07			-.04	
Creator ^a	.04			-.18		
Critic ^a	.23			.07		
<i>Step 2</i>		.08	.01		-.07	.00
Creator ^a	-.03			-.18		
Critic ^a	.21			.07		
CreatorXCritic ^b	.15			.00		

*Statistic is significant at $p < .05$ (2-tailed) ^aCentered variable ^bInteraction term of centered variables

Key: β =standardized regression coefficient; R^2 =variance explained; ΔR^2 =change in variance explained; TE1=first decision period team effectiveness (percentage of maximum possible profit score); TE2=second decision period team effectiveness (percentage of maximum possible profit score).

Table 5 Summary of Team-Level Hypotheses for First Decision Period Team Effectiveness

Hypothesis	Description	Supported?
1a	The number of <i>Creators</i> on a team will be positively related to team effectiveness.	No
1b	The number of <i>Communicators</i> on a team will be positively related to team effectiveness.	No
1c	The number of <i>Completers</i> on a team will be positively related to team effectiveness.	Yes
1d	The <i>total number of informal roles performed</i> on a team will be positively related to team effectiveness.	Marginally
1e	The total number of informal roles performed by at least one individual on a team (i.e., <i>team balance</i>) will be positively related to team effectiveness.	No
2	The <i>number of Creators and Critics represented on a team will interact</i> such that the positive slope of the relationship with team effectiveness will be significantly greater than the slopes of the main effects of the two roles by themselves.	No

Table 6 Summary of Team-Level Hypotheses for Second Decision Period Team Effectiveness

Hypothesis	Description	Supported?
1a	The number of <i>Creators</i> on a team will be positively related to team effectiveness.	No
1b	The number of <i>Communicators</i> on a team will be positively related to team effectiveness.	No
1c	The number of <i>Completers</i> on a team will be positively related to team effectiveness.	No
1d	The <i>total number of informal roles performed</i> on a team will be positively related to team effectiveness.	No
1e	The total number of informal roles performed by at least one individual on a team (i.e., <i>team balance</i>) will be positively related to team effectiveness.	No
2	The <i>number of Creators and Critics represented on a team will interact</i> such that the positive slope of the relationship with team effectiveness will be significantly greater than the slopes of the main effects of the two roles by themselves.	No

Table 7 Summary of Individual-Level Hypotheses

Hypothesis	Description	Supported?
3a	<i>Agreeableness</i> will be positively related to adoption of the <i>Communicator</i> role.	Yes
3b	<i>Agreeableness</i> will be positively related to adoption of the <i>Calibrator</i> role.	No
4a	<i>Conscientiousness</i> will be positively related to adoption of the <i>Contractor</i> role.	Marginally
4b	<i>Conscientiousness</i> will be positively related to adoption of the <i>Creator</i> role.	No
4c	<i>Conscientiousness</i> will be positively related to adoption of the <i>Contributor</i> role.	No
4d	<i>Conscientiousness</i> will be positively related to adoption of the <i>Completer</i> role.	No
4e	<i>Conscientiousness</i> will be positively related to adoption of the <i>Critic</i> role.	No
5a	<i>Openness to Experience</i> will be negatively related to adoption of the <i>Contractor</i> role.	No
5b	<i>Openness to Experience</i> will be negatively related to adoption of the <i>Creator</i> role.	No
5c	<i>Openness to Experience</i> will be negatively related to adoption of the <i>Contributor</i> role.	No
5d	<i>Openness to Experience</i> will be negatively related to adoption of the <i>Completer</i> role.	No
5e	<i>Openness to Experience</i> will be negatively related to adoption of the <i>Critic</i> role.	No
6a	<i>Extraversion</i> will be negatively related to adoption of the <i>Contractor</i> role.	No
6b	<i>Extraversion</i> will be negatively related to adoption of the <i>Creator</i> role.	No
6c	<i>Extraversion</i> will be negatively related to adoption of the <i>Contributor</i> role.	No
6d	<i>Extraversion</i> will be negatively related to adoption of the <i>Completer</i> role.	No
6e	<i>Extraversion</i> will be negatively related to adoption of the <i>Critic</i> role.	No

Table 8 Correlations Between Team-Level Predictor Variables and Second Decision Period Team Effectiveness When Controlling for First Decision Period Team Effectiveness

	TE2	TE2 Controlling for TE1
Contractors	-.21	-.23
Creators	-.13	-.18
Contributors	-.07	-.12
Completers	.04	-.05
Critics	-.06	-.13
Communicators	-.05	-.07
Calibrators	.16	-.12
Total Roles	-.07	-.14
Team Balance	-.18	-.24

*Correlation is significant at the .05 alpha level (2-tailed) **Correlation is significant at the .01 alpha level (2-tailed)

Key: Total Roles=total number of informal roles performed within a team; Team Balance=number of distinct informal roles filled by at least one individual; TE1=first decision period team effectiveness (percentage of maximum possible profit score); TE2=second decision period team effectiveness (percentage of maximum possible profit score).

Table 9 Regression Analyses Between Team-Level Informal Roles and Effectiveness

Informal Role	TE1		TE2	
	<i>b</i>	β	<i>b</i>	β
Contractor	-1.96	-.22	-5.37*	-.43*
Creator	-1.55	-.16	-6.35	-.47
Contributor	-1.00	-.11	-1.07	-.08
Completer	4.90**	.53**	5.30	.42
Critic	1.79	.19	.71	.05
Communicator	-1.49	-.16	-2.19	-.17
Calibrator	2.48	.18	10.57*	.55*

*Regression coefficient is marginally significant at $p \leq .10$ (2-tailed) **Regression coefficient is significant at $p < .05$ (2-tailed)

Key: *b*=unstandardized regression (slope) coefficient; β =standardized regression coefficient; TE1=first decision period team effectiveness (percentage of maximum possible profit score); TE2=second decision period team effectiveness (percentage of maximum possible profit score).

Table 10 Hierarchical Regression Analyses Testing Significance of Incremental Variance Explained by the Level Effect.

Model/Predictor	TE1			TE2		
	β	R^2	ΔR^2	β	R^2	ΔR^2
<i>Step 1</i>		.13*			.26**	
Pattern Effect	.36*			.51**		
<i>Step 2</i>		.19*	.06		.26**	.01
Pattern Effect	.34*			.53**		
Level Effect	.25			.09		

*Statistic is significant at $p < .05$ (2-tailed) ** Statistic is significant at $p < .01$ (2-tailed)

Key: β =standardized regression coefficient; R^2 =variance explained; ΔR^2 =change in variance explained; TE1=first decision period team effectiveness (percentage of maximum possible profit score); TE2=second decision period team effectiveness (percentage of maximum possible profit score).

Table 11 Hierarchical Regression Analyses Testing Significance of Incremental Variance Explained by the Pattern Effect.

Model/Predictor	TE1			TE2		
	β	R^2	ΔR^2	β	R^2	ΔR^2
<i>Step 1</i>						
Level Effect	.27	.08		-.07	.01	
<i>Step 2</i>						
Level Effect	.25	.19*	.12*	.09	.26**	.26**
Pattern Effect	.34*			.53**		

*Statistic is significant at $p < .05$ (2-tailed) ** Statistic is significant at $p < .01$ (2-tailed)

Key: β =standardized regression coefficient; R^2 =variance explained; ΔR^2 =change in variance explained; TE1=first decision period team effectiveness (percentage of maximum possible profit score); TE2=second decision period team effectiveness (percentage of maximum possible profit score).

FIGURES

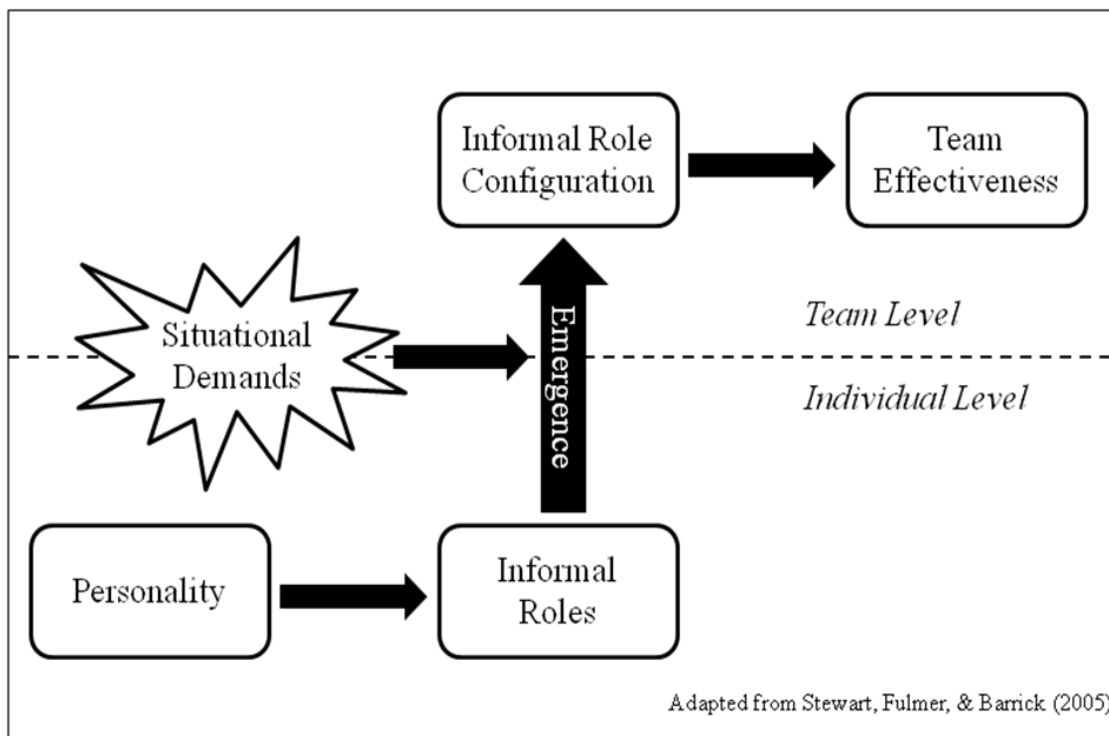


Figure 1 Conceptual Framework of the Present Study

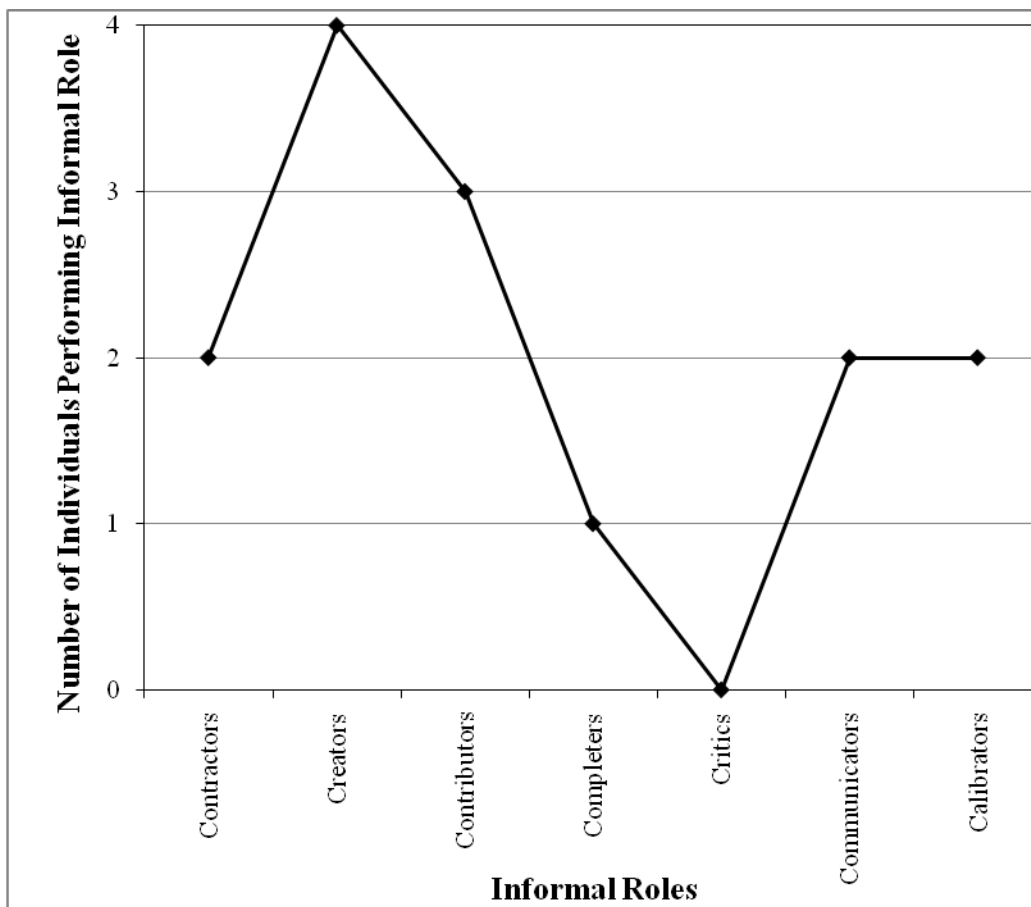


Figure 2 Sample Profile Pattern for a Single Team

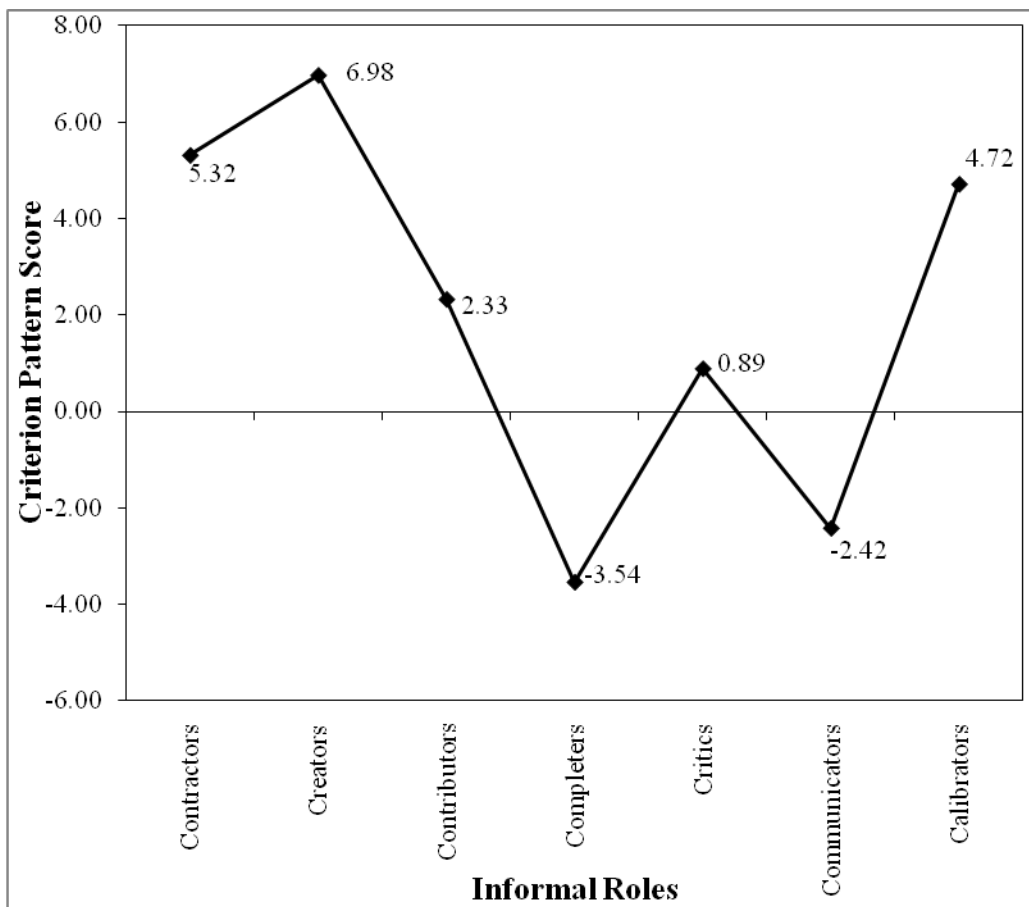


Figure 3 Sample Criterion Pattern Associated With High Levels of Team Effectiveness

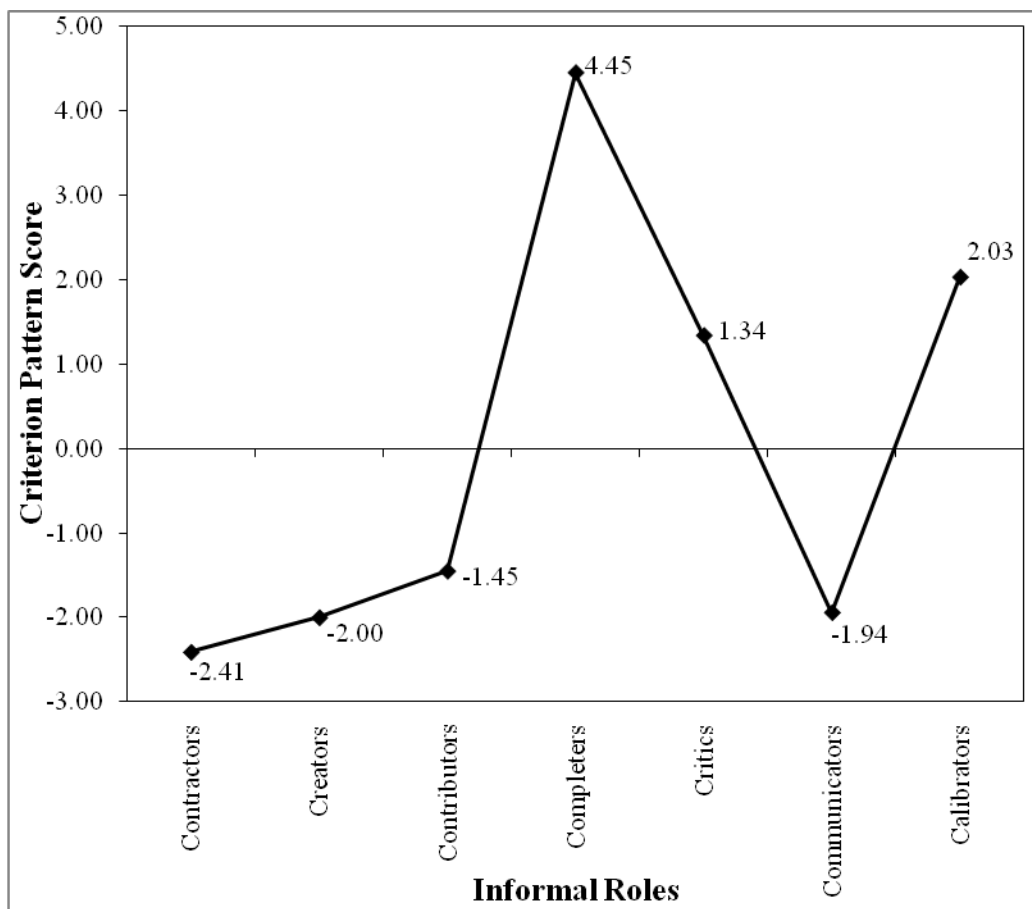


Figure 4 Criterion Profile for First Decision Period Team Effectiveness

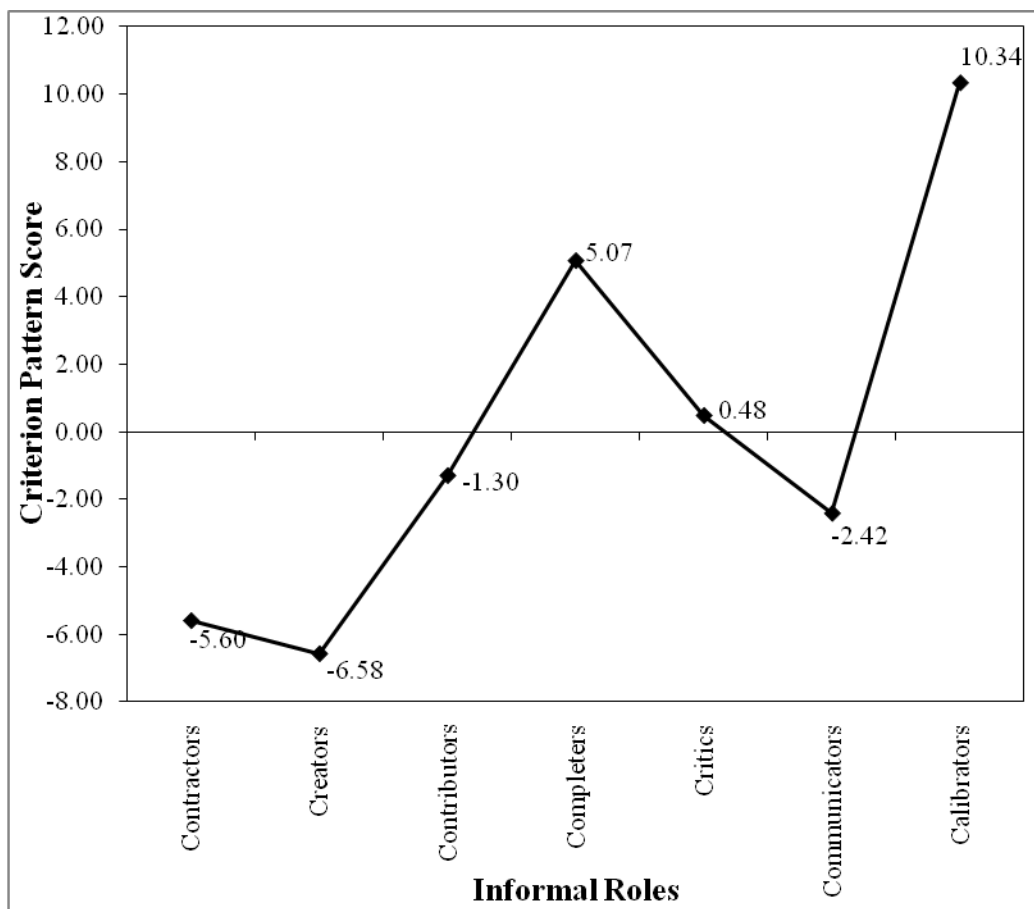


Figure 5 Criterion Pattern for Second Decision Period Team Effectiveness

APPENDICES

Appendix A: Proposal Introduction

Introduction

The nature of organizations continues to change throughout the world as organizational structure and work-related tasks become increasingly complex. In order to adapt, organizations use growing numbers of work *teams* to accomplish tasks, meet goals, and achieve objectives (Ilgen, Major Hollenbeck, & Segoe, 1993). The term *team* refers to an interdependent collection of individuals working together toward a shared and valued goal, objective, or mission (Hackman, 1987), and estimates suggest that nearly half of all organizations in the United States employ at least one or more teams (Devine, Clayton, Philips, Dunford, & Melner, 1999). Furthermore, past theory and research indicate that, under certain circumstances, a team is capable of performance that is greater than the sum of the individual efforts (Forsyth, 1998). For these reasons, there has been a push to better understand the characteristics of effective teams.

One way to conceptualize team effectiveness is through an input-process-output model, where team effectiveness hinges on inputs and processes that influence a team's ability to successfully meet or exceed a collective goal, objective, or mission (Gladstein, 1984; Hackman, 1987; Hackman & Morris, 1975; McGrath, 1964). For example, inputs such as situational demands, access to resources, and the configuration of individual difference characteristics, all contribute to a team's effectiveness (Chidester, 1987). In addition, team effectiveness depends upon processes such as decision-making and communication as well as outputs such as task performance, innovation, and member

satisfaction (Gladstein, 1984). Therefore, team effectiveness reflects both individual and team inputs and team processes and their influence on team outputs.

Some researchers have suggested that a critical linking mechanism between individual inputs and team outputs is *informal roles* (Stewart, Fulmer, & Barrick, 2005). That is, the behavioral patterns and tendencies associated with informal roles are thought to emerge because of dispositional traits and situational demands (Forsyth, 1998; Mumford, Iddekinge, Morgeson, & Campion, 2008; Stewart et al., 2005). In addition, research suggests that informal roles influence team processes and outputs (Guzzo & Dickson, 1996). Therefore, it should be at the team-level that the configuration of informal roles influences team-level processes and outputs such as cohesion and task performance (Stewart et al., 2005).

The potential relationship between informal roles and team effectiveness has important practical implications as well. A team's configuration of informal roles could be used to predict team task performance and productivity and, as a result, organizations could use knowledge about informal roles in decision-making. For example, an organization could create teams with effective informal role configurations and disband teams with ineffective configurations. In this way, an organization could maximize its competitive advantage over other organizations.

Also of practical importance is being able to predict team members' adoption of informal roles. One potential predictor of informal roles is *personality* which refers to a person's characteristic patterns of thought and behavior (Funder, 2001). Evidence suggests that some personality traits influence a person's tendency to adopt certain informal roles (Blumberg, 2001; Stewart et al., 2005). The logic being, personality

behavior remains relatively stable across situations and, therefore, should to some extent influence situation-dependent behavior clusters such as informal roles. As such, assessing a person's personality traits may prove to be an effective way of predicting the adoption of informal roles.

In summary, theory suggests that informal roles may serve as a potential linking mechanism between individual team inputs and team processes and outputs (Katz & Kahn, 1978; Stewart et al., 2005). Specifically, stable dispositional inputs (e.g., personality) are expected to influence the adoption of situation-dependent informal roles which should, collectively, influence team-level processes and outputs (e.g., team effectiveness). The present study will further investigate the relationship between informal roles and team effectiveness as well as the link between personality and informal roles. The results of this study could have implications for Human Resource selection techniques and team assembly and disassembly. In the following sections, I will begin by presenting a framework that lays out the conceptual foundation of this study. Following the framework, I will review the relevant literature, formulate hypotheses, and describe the method I will use to test the hypotheses.

Conceptual Framework

Stewart, Fulmer, and Barrick (2005) presented a general model in which informal roles serve as a linking mechanism between individual traits (i.e., personality) and team outcomes. For the purposes of the present study, I have adapted their model (see Appendix A) to serve as the guiding framework for the present study. The model consists of four primary components: (1) Personality, (2) Informal Roles, (3) Informal Role

Configuration, and (4) Team Effectiveness. Three arrows in Appendix A connect these four components and, thus, represent the proposed relationships. A fourth arrow intersects the linking arrow between informal roles and informal role configuration; this arrow represents the moderating influence that situational demands exert on the emergent processes. In addition to the components and linking arrows, the framework is separated into two halves by a horizontal dashed-line. This dashed-line distinguishes individual-level phenomena and team-level phenomena. Personality and informal roles sit beneath the dashed-line and, accordingly, represent individual-level phenomena. On the other hand, informal role configuration and team effectiveness represent team-level phenomena given that they are positioned above the dashed line. Appendix B and Appendix C depict the primary and secondary purposes, respectively, of the present study. As shown in Appendix B, the primary purpose is to investigate the relationship between informal roles, informal role configuration, and team effectiveness. The secondary purpose (see Appendix C) is to investigate the relationship between personality and informal roles.

The structure of the following literature review is organized according to the primary and secondary purposes of this study. I will begin with a review of the three components diagrammed in Appendix B. First, I will provide an overview of informal roles, informal role configuration, and team effectiveness. After defining the constructs, I will review studies that have explored the empirical links between informal roles, informal role configuration, and team effectiveness. Next, the emphasis will shift to the secondary purpose of this study: investigating the relationship between personality and informal roles (refer to Appendix C). In that section, I will define the construct of

personality. Finally, I will review research that has explored the relationship between personality and informal roles.

Previous Theory and Research

Informal Roles

As evidenced by Stewart et al.'s (2005) framework (refer to Appendix A), informal roles are key components of the present study's primary and secondary purposes. In the following section, I will begin by clarifying the distinction between formal and informal roles and provide a definition for informal roles. Finally, I will review relevant informal role taxonomies and identify an integrated approach.

Definition

There are two types of team roles: (1) formal and (2) informal. A *formal role* represents a cluster of a team member's official duties and responsibilities that he or she is *supposed* to perform. As such, a formal role refers to a person's officially designated status, position, or title within the team (Hare, 1994). For example, organizations often officially appoint a person to fill the role of team leader, and that decision is formally communicated to team members. In contrast, an *informal role* represents a team member's *actual* behavior patterns as opposed to the duties and responsibilities that he or she is *supposed* to perform (Hare, 1994). In other words, formal roles prescribe how team members *should* behave, whereas informal roles describe how team members *do* behave.

Informal roles emerge because of team member interactions in a specific team context (Katz & Kahn, 1978; Stewart et al., 2005). That is, the manner in which team members interact is influenced by individual characteristics (e.g., personality) and situational demands (e.g., the nature of a team's task, the formal roles already in place). Thus, an informal role refers to the context-specific pattern of related behaviors that a team member adopts as a result of team interaction (Mumford et al., 2008; Stewart et al., 2005). In order to classify and organize related behaviors into distinct informal roles, researchers and practitioners alike have developed a variety of taxonomies for informal roles on teams. In the following sections, I will review some of the more prominent taxonomies in chronological order.

Benne and Sheats' Taxonomy

Over the past 60 years, several informal role taxonomies and measures have been introduced (e.g., Bales, 1950; Belbin, 1981, 1993; Benne & Sheats, 1948; Dubrin, 1995; McCann & Margerison, 1995). For instance, Benne and Sheats (1948) developed a taxonomy based upon observations at the National Training Laboratory for Group Development (NTL). The NTL itself was developed by the United States government to further research related to team development and to create team training interventions. From their observations at the NTL, Benne and Sheats argued that *actual* role behaviors (i.e., informal role behaviors) had to be identified prior to training team members to enact formal roles.

Benne and Sheats (1948) grouped informal roles into three categories: (1) task, (2) building and maintenance, and (3) individual. The *task role* category includes those

roles that directly contribute to team task completion. People filling such roles facilitate and coordinate the processes necessary for task completion. This category consists of 12 informal roles with associated behavioral descriptions. Examples of task roles include: the Coordinator (i.e., coordinates information, ideas, and activities in order to clarify common themes), the Energizer (i.e., pushes the team to act or make quality decisions), and the Information Seeker (i.e., asks for additional information and interpretations regarding the suggestions made by others).

The *building and maintenance role* category, on the other hand, includes those roles that directly contribute to a team's positive social interactions and indirectly contribute to team task completion. That is, people in these roles contribute to a team's social and emotional environment by encouraging cooperative and cohesive interpersonal interactions. In turn, teams with greater cooperation and cohesiveness tend to interact in ways that are conducive for task-related information sharing and communication. Therefore, although building and maintenance roles do not directly impact team task performance, they influence contextual interpersonal processes that indirectly contribute to successful task completion. In total, there are seven roles that fall under this category. Examples of those roles include the Follower (i.e., acts as an audience for proposed ideas and follows the ideas of others), the Harmonizer (i.e., serves as a peacemaker and unites members during disagreements), and the Encourager (i.e., commends and praises the ideas and actions of others).

Finally, the *individual role* category consists of roles that are either self-serving or not in alignment with the team's goals. This third category consists of eight underlying roles, including the Blocker (i.e., disagrees and resists the ideas and initiatives of others;

blocks team progress toward task completion), the Recognition Seeker (i.e., directs attention away from the team; calls attention to oneself), and the Dominator (i.e., uses authority and power to manipulate the team). As evidenced by the role descriptions, these roles tend to be detriments to team task success and effective social interactions. In all, the three role categories contain 27 informal roles.

Bales' Taxonomy

In a separate line of research, Bales (1950) developed an informal role taxonomy to identify and code fundamental team behaviors for what is called the Interaction Process Analysis (IPA). His taxonomy consists of 12 key behaviors (e.g., Gives suggestions, Shows solidarity, Shows antagonism, Disagrees, etc.) divided evenly between two role categories (i.e., task, socioemotional). Although referred to as key behaviors, essentially they refer to clusters of behavior that are synonymous with the definition of informal roles; accordingly, they will henceforth be referred to as such. Unlike Benne and Sheats' (1948) roles, however, Bales' (1950) roles are not labeled with descriptive role names (e.g., Harmonizer, Encourager); rather, they are each described by a behavioral action statement that captures the nature of the underlying cluster of related behaviors.

As mentioned above, six informal roles are related to the *task role* category and another six informal roles are related to the *socioemotional role* category. In Bales' (1950) taxonomy, both role categories are assumed to be critical for effective team functioning. Meaning, teams adopting a disproportionate number of task category roles will likely begin to suffer interpersonally. Similarly, teams adopting too many

socioemotional category roles will likely experience problems due to poor progression toward successful task completion. Under this assumption, teams with balanced roles will tend to experience less social- and task-related tensions.

Like the task role category of Benne and Sheats' (1948) taxonomy, Bales' (1950) task role category includes those role behaviors that contribute directly to the task. The six roles are as follows: (1) Gives suggestions, (2) Gives opinions, (3) Gives orientation, (4) Asks for suggestions, (5) Asks for opinions, and (6) Asks for orientation. As evidenced by the labels, the roles may be categorized by the extent to which they are dominant or submissive, where dominant roles refer to those with the verb stem "gives" and submissive roles include those with the stem "asks."

With regard to the socioemotional role category, it was conceptualized in much the same way as Benne and Sheats' (1948) building and maintenance role category. Consequently, it includes those roles that are not directly task-related but, rather, contribute to team social functioning. The six roles in this category are: (1) Shows solidarity, (2) Shows tension release, (3) Agrees, (4) Shows antagonism, (5) Shows tension, and (6) Disagrees. These roles may be classified by their positive or negative valence. As such, the first three roles listed are all positive in nature in that they promote effective social functioning. In contrast, the second three roles negatively impact a team's socioemotional functioning.

After publishing the IPA (Bales, 1950), Bales and Cohen (1979) created the System for Multiple Level Observation of Groups (SYMLOG). This new method for measuring team roles introduced a more advanced coding system for categorizing behaviors. In general, however, Bales and Cohen preserved the core characteristics of the

original characteristics of the IPA. Most notably, SYMLOG categorizes role behaviors along task and social role categories.

Belbin's Taxonomy

After nine years of observing managers in training courses, Belbin (1981, 1993) developed his own informal role taxonomy (see Appendix D) that is based upon some of Bales' (1950) taxonomy roles. Belbin's (1981) taxonomy originally included eight informal roles, although it was later expanded to nine (Belbin, 1993). Further, he proposed that each of his roles was necessary for team success. That is, effective teams contain representatives who each enact a distinct role that is essential for team functioning. In his words, a team is considered "balanced" if every role is filled.

To assess informal role balance, Belbin constructed two measures of a person's natural inclination to adopt a role (or multiple roles). The first method, the Belbin Team-Role Self-Perception Inventory (BTRSPI), is a self-report measure of informal role tendencies, and the second method, the Observer's Assessment Sheet (OAS), is an observer checklist of a team member's informal role tendencies. One study found significant correlations between the BTRSPI and OAS for eight of the nine roles (Broucek & Randell, 1996); however, the sizes of some of the correlations were disconcertingly low. For instance, the correlations between role scores from the two measures were only $r = .11$ for the Coordinator role and $r = .19$ for the Specialist role. In fact, the highest between-method correlation was $r = .40$ for the Shaper role.

With respect to the BTRSPI, several teams of researchers have investigated its psychometric properties (e.g., Aritzeta, Swailes, & Senior, 2007; Dulewicz, 1995; Fisher,

Hunter, & Macrosson, 2001; Furnham, Steele, & Pendleton, 1993; Swailes & Aritzeta, 2006). For example, Furnham and colleagues (1993) found the original measure, as well as two variations, to have low coefficient alpha reliability estimates and poor factor support for the taxonomy's roles. More recently, Aritzeta and colleagues (2007) conducted a review of 43 empirical studies using the measure. The authors found that, in general, evidence was conflicting with regard to the psychometric characteristics of the inventory. Most notably, they found strong correlations between certain team roles (e.g., $r = .58$, $r = .57$) which are suggestive of low discriminant validity. In support of the measure, however, Aritzeta and colleagues concluded the roles assessed by the measure indicated relatively good convergent validity.

The design and content of the BTRSPI are also suggestive of the measure's questionable construct validity. Most notably, the items do not instruct participants to think of a specific team context in which they have participated. Rather, the items are designed to assess a person's cross-situational informal role behavioral tendencies. For instance, the following two items demonstrate such behavioral generalizations: (1) "I gain satisfaction in a job because I enjoy analyzing situations and weighing up all the possible choices;" and (2) "My characteristic approach to group work is that I contribute where I know what I am talking about." Phrases such as these refer to general tendencies as opposed to inclinations in a specific team composed of specific people. In summary, the way in which Belbin defines informal roles is conceptually similar to that of others, but his measures do not specify a specific team context. Instead, they appear to measure stable individual traits. Therefore, Belbin's measures of team role performance (i.e., OAS and BTRSPI) demonstrate questionable psychometric properties.

Other Informal Role Taxonomies

When compared to the taxonomies of Benne and Sheats (1948), Bales (1950), and Belbin (1981, 1993), the following taxonomies have received relatively little empirical attention (i.e., Ancona & Caldwell, 1988, 1992; Barry, 1991; Davis, Millburn, Murphy, & Woodhouse, 1992; Dubrin, 1995; McCann & Margerison, 1989, 1995; Parker, 1994, 1996; Woodcock, 1989). Therefore, I will only highlight those taxonomies that have made unique contributions to the conceptualization of informal roles. For instance, Ancona and Caldwell (1988, 1992) emphasized *boundary-spanning roles* in modern teams. As the name implies, these roles include behaviors that span across team boundaries. Specifically, boundary-spanning roles include behaviors that have an external focus; meaning, they bridge the gap between the team and other teams or between the team and the organization. In that sense, people performing boundary-spanning roles typically act as inter-team liaisons. Also of note, Barry (1991) developed a taxonomy that identifies the emergence of leadership roles in teams where a formal leader has not already been designated. His qualitative research tapped into an increasingly common phenomenon in which teams are assembled and provided with little or no formal structure. To date, however, there is no empirical evidence to support Barry's taxonomy.

In summary, most of these taxonomies have received very little if any empirical attention. However, several have offered distinctive approaches to conceptualizing informal roles and, thus, have added value to the literature. For this reason, Mumford and colleagues (2006, 2008) included some of these taxonomies in their integrative informal role taxonomy. The Mumford taxonomy will be reviewed in depth in the following paragraphs.

Integrating Informal Role Taxonomies

As evidenced by this review, multiple informal role taxonomies exist. Some taxonomies overlap substantially in terms of the behavior clusters assessed, while still others introduce new role types. Recognizing the lack of consensus, Mumford and colleagues (Mumford, 2002; Mumford et al., 2006) developed an informal role taxonomy that integrated the roles from different taxonomies. Specifically, they recognized the importance of integrating *internally focused* roles (e.g., Bales, 1950; Benne & Sheats, 1948) and *externally focused* roles (e.g., Ancona & Caldwell, 1988, 1992) into a single taxonomy. Internally focused roles refer to those roles whose behaviors occur entirely between members of the team and, thus, are contained within the team. In contrast, externally focused roles are commonly referred to as boundary-spanning roles in that they interact with people external to the team in order to recruit information and resources that help the team achieve its goals (Ancona & Caldwell, 1988).

Integrating the roles from different taxonomies required a multi-step process (Mumford, 2002; Mumford et al., 2006). To begin with, Mumford and colleagues reviewed the informal role literature and catalogued the roles across taxonomies. Next, they listed all of the identified informal roles on individual note cards. This process resulted in 120 note cards, each representing a role and its definition. During the third step, the cards were sorted into homogenous groups using a *q-sort methodology*. To conduct the q-sort, two researchers independently sorted the roles into functionally homogenous groups; meaning, roles fulfilling the same behavioral function for the team were grouped together into common categories. The sorting of the roles resulted in a similar number of role categories for each researcher (i.e., 11 role categories versus 13

role categories). Upon completing the q-sort, the two researchers discussed their respective choices and attempted to reconcile any differences. After the discussion, it was decided to merge three categories and split one category into two which resulted in consensus on the resulting 11 categories. Between the two researchers, the level of agreement on the placement of roles in the same category was high (Kappa = .80) in that 99 out of 120 roles (83%) were placed in the same category. In the end, the researchers did not include dysfunctional roles (i.e., roles that are a detriment to team success), such as the roles in Benne and Sheats' (1948) individual role category, because the goal was to include only those role categories that contributed to successful team functioning. Eliminating the dysfunctional role category reduced the total number of role categories from 11 to 10.

As evidenced above, the Mumford taxonomy (Mumford, 2002; Mumford et al., 2006) integrates roles from previously published taxonomies (e.g., Ancona & Caldwell, 1992; Bales, 1950; Barry, 1991; Belbin, 1993; Benne & Sheats, 1948; Dubrin, 1995; McCann & Margerison, 1995; Parker, 1996). Using the informal roles associated with various taxonomies, Mumford and colleagues identified 10 distinct roles underlying three role categories: (1) task, (2) social, and (3) boundary-spanning. However, in a validation study, analysis of the 10-role taxonomy demonstrated low convergent validity within the social role category in that the correlations between the Cooperator, Communicator, and Calibrator roles were close to zero or even negative (Mumford et al., 2008). Consequently, Mumford and colleagues revised the taxonomy by eliminating the Cooperator role, leaving nine informal roles embedded in the three role categories.

The *task role* category includes the informal roles of Contractor, Creator, Contributor, Completer, and Critic. These roles feature behaviors directly associated with accomplishing the team's task objectives. For instance, the Contractor refers to behaviors related to organizing and coordinating team activities. That is, the Contractor directs team members to focus on completing the team task efficiently. In essence, the key function of this role is to provide structure to the team's task-oriented behaviors. The Creator suggests original and/or innovative solutions to the team's task-related problems and provides a fresh perspective with regard to problem solving. In general, people filling this role grasp the "big picture" and think of creative solutions that help the team meet collective objectives. Moreover, the Creator influences the approaches that a team takes to successfully perform a task. As the name implies, the Contributor contributes unique information or expertise to the team. This means that people performing this role tend to speak out when they have specialized knowledge related to the team's task and, because of this, they tend to emerge as task leaders when they have prior experience in a relevant subject area. The Completer, on the other hand, spearheads the individual-oriented tasks in the team until completed. Team members performing this role follow through on commitments they made to the team and finish individual-oriented tasks on time and without reminders. In general, the Completer takes responsibility for completing tasks. Finally, the Critic role covers those behaviors associated with questioning and commenting on the team's task structure and processes (i.e., the manner in which the team chooses to coordinate and organize information related to meeting objectives). In a sense, the Critic plays the part of the "Devil's Advocate" in that he or she points out shortcomings of a team's actions and decisions. Specifically, people performing this role

speak out when they have concerns related to the team's work. They also make sure the team discusses the pros and cons of each task-related decision. In summary, the Critic shares opinions about the quality of a team's work processes and outputs, even if those opinions are negative.

The second role category deals with the *social roles*. This category includes the roles of Communicator and Calibrator. Roles in the social role category consist of contextual behaviors that facilitate the team's socioemotional environment. That is, their behaviors support and maintain the team's cohesion, morale, and mood. For instance, the Communicator's primary function is to create a social environment conducive to collaboration. Team members adopting this role make interactions pleasant and comfortable by being happy and easy to work with. In addition, the Communicator tends to listen carefully and intently to the thoughts, feelings, and emotions of fellow team members. Finally, the Communicator strives to communicate personal feelings and thoughts in a respectful manner. With social norms in mind, the Calibrator performs behaviors that function to observe the team's social processes, make the team aware of the social processes, and ultimately, suggest changes to the observed social processes. As such, people in this role help settle conflicts between team members and intervene to resolve difficulties when there are negative feelings. Additionally, the Calibrator suggests positive ways for team members to interact (i.e., being open to new ideas, showing respect, taking turns).

The third and final category is called the *boundary-spanning role* category. This category includes the informal roles of Consul and Coordinator. Roles in the boundary-spanning role category pertain to behaviors that facilitate team functioning with the

external environment (i.e., other teams, the overarching organization, other organizations). For instance, the Consul interacts with those external to the team in order to favorably market the team. Behaviors consistent with this role include: sharing accomplishments with non-team members, gaining support from important or influential non-team members, and frequently updating non-team members with information about the team's successes. Thus, the primary emphasis of this role is to favorably showcase the team's processes and outputs. Like the Consul, the Coordinator interacts with people outside of the team. More specifically, the Coordinator interacts with non-team members to garner information, ideas, and other resources. People performing this role tend to seek out and bring critical information back to the team that may improve decision-making. In addition, people in this role interact with those external to the team to gain special knowledge about the team's tasks, processes, and/or performance. Thus, the Coordinator brings external resources back to the team that may improve team effectiveness.

In summary, Mumford and colleagues (Mumford, 2002; Mumford et al., 2006) integrated over 120 informal roles into a single taxonomy. Today, their taxonomy includes nine informal roles nested within three role categories (Mumford et al., 2008). The task role category includes the roles of Contractor, Creator, Contributor, Completer, and Critic, while the social role category is made up of the Communicator and Calibrator roles. Finally, the boundary-spanning role category includes the Consul and Coordinator. To measure the extent to which team members perform each informal role, the researchers developed a measure called the Team Role Performance (TRP) test. For a detailed description of the TRP, please refer to the Method section.

Informal Role Configuration

Using individual-level informal roles to predict team-level performance presents a level-of-analysis issue (Stewart et al., 2005). That is, the aggregation of informal roles to a team-level construct is not necessarily the sum or average of those individual difference variables (Kozlowski & Klein, 2000; Stewart et al., 2005). In general, the informal roles performed by an individual are influenced by the roles performed by team members as well as by other situational demands. For instance, Team Member A may be naturally inclined to perform a specific role but Team Member B may already be performing that same role. As a result, Team Member A may perform an alternative role. That is not to say, however, that the same role may not be duplicated on a team. Rather, that example illustrates the interactional effects that influence an individual's tendency to adopt a given informal role. Therefore, even at the individual-level, the roles performed by a team member are influenced by roles performed by others. This suggests that team context (i.e., situational demands) is an important influence of individual-level informal role performance (Stewart et al., 2005). Furthermore, at the team-level of analysis, both internal (e.g., informal roles of team members, task type) and external (i.e., influences originating outside of the team) situational demands shape how individual-level informal roles affect team-level behavioral outputs such as team task performance.

As alluded to above, a collection of informal roles performed within a team is best conceptualized at the team-level. The term *informal role configuration* refers to the structure of informal roles at the team-level whereby different structures constitute different patterns of activity between team members (LePine, 2003). Moreover, qualitative differences may exist between individual-level roles and the collective team-

level role structure involving those same individual-level roles. Namely, at the team-level informal roles become the collective amalgamation known as the informal role configuration.

In the case of informal roles, informal role structure is the result of a bottom-up process called *emergence* whereby lower level constructs aggregate to form higher level constructs (Kozlowski & Klein, 2000). Because informal roles manifest at the team-level in the form of an informal role configuration, informal roles are said to have *emergent properties*. In general, emergent properties result from social-psychological interactions and information exchanges between team members (Kozlowski & Klein, 2000). That is, emergence involves not only the characteristics of each individual but also the behavioral, informational, and emotional interactions between a collective of individuals. In essence, the theory of emergence provides an explanation as to why organizations continue to emphasize teams and teamwork. By working together, a team has the potential to produce an output that is greater (or qualitatively different) than the collective output of the same team members working independently. In support of this, a team composed entirely of high performing individuals will not necessarily yield high team-level performance (Schneider, Smith, & Sipe, 2000). Thus, through emergence, team-level behavior may demonstrate qualities that are different than the sum or average of individual-level behavior.

In the present study, informal role configuration will serve as the team-level behavior that emerges from individual-level informal role behavior. This team-level structure of informal roles will be operationalized as a *vector* capturing the number of individuals filling each role. In general, the approach I am taking is not new as it has been

used by past researchers to describe a team's informal role configuration. In particular, several studies using Belbin's (1981, 1993) taxonomy conceptualized informal role configuration in terms of which roles were manifested within a team (e.g., Blenkinsop & Maddison, 2007; Prichard & Stanton, 1999; Senior, 1997). However, those same studies placed a limit on the number of informal roles a team member was said to have adopted. In contrast, the vector approach imposes no such limit. For example, using an informal role configuration vector, a single team member could potentially perform every role found in Mumford et al.'s (2006, 2008) taxonomy. In this way, the vector should prove to be more generalizable to actual work teams because, in real world settings, some individuals may perform a wide array of roles. Finally, teams may be differentiated from one another based upon variations in their informal role configurations vectors. In this way, I propose that meaningful differences in informal role configurations will result in varying levels of team effectiveness.

Team Effectiveness

In general, *team effectiveness* refers to the consequences of a team's inputs, processes, and outputs (Gladstein, 1984; Hackman, 1987). That is, it varies based upon the characteristics, behaviors, and context of a team (Chidester, 1987). This suggests that team effectiveness cannot be universally defined for all teams. Rather, the definition hinges upon the team context and situational constraints in which a team operates (Devine, 2002). In order to identify an appropriate method of measuring team effectiveness, I will define and review the construct as it relates to the present study.

According to Hackman's (1987) broad definition of team success, there are two primary components of team effectiveness: (1) performance and (2) viability.

Performance refers to the quality and/or quantity of a team's outputs, whereas *viability* refers to a team's capability to endure into the future. These two components represent a number of team process and outcome variables such as team cohesion, team conflict, team communication, member flexibility, workload sharing, team task performance (Barrick, Stewart, Neubert, & Mount, 1998), productivity, member well-being, and innovation (Brodbeck, 1996). The relevance of such process and outcome variables depend upon the *team type*, where team type is defined by the situational context (i.e., situational demands) in which a team operates (Devine, 2002). For instance, a team may be classified in relation to a series of context variables such as fundamental work cycle, physical ability requirements, temporal duration, task structure, active resistance, hardware dependence, and health risk (Devine, 2002). Thus, when defining team effectiveness, it is necessary to consider how team effectiveness varies in relation to team context, or rather, situational demands.

In addition to team context, the level of team effectiveness is dependent upon other individual- and team-levels components. Examples of individual-level components include characteristics such as traits, knowledge, skills, and abilities, whereas the team-level components refer to the processes and the outcomes of a team's work. On one hand, team processes describe the manner in which individuals collaborate, interact, and work together toward a common goal. For example, processes include communicating, coordinating, and decision-making (Gladstein, 1984). On the other hand, a team outcome is the result of individual characteristics, situational demands, and team processes. Output

variables include, for example, team member satisfaction, productivity, performance, and innovation (Gladstein, 1984).

In the present study, informal roles should bridge the gap between the individual-level characteristic of personality and team-level processes influenced by informal role configuration. That is, informal roles should be influenced not only by individual characteristics but also by team processes such as communication, coordination, and decision-making. Accordingly, the informal roles adopted by team members should impact the extent to which a team experiences negative processes such as social loafing (i.e., feelings of low accountability of individual team members that reduces motivation to perform) and dysfunctional team conflict (Steiner, 1972). Finally, the emergence of an informal role configuration should influence team-level process behaviors that, in turn, influence team outcomes. Thus, together the components of personality, situational demands, informal roles, and informal role configuration should impact team effectiveness.

Links Between Informal Roles, Role Configuration, and Team Effectiveness

The relationships between informal roles, team informal role configuration, and team effectiveness have been tested in a handful of studies. Of those studies, the majority used Belbin's (1981, 1993) BTRSPI to measure informal roles while another used Bales' (1950) taxonomy and SYMLOG Adjective Rating Form (Bales & Cohen, 1979). The following section reviews past empirical attempts to assess the links between informal roles, informal role configuration, and team effectiveness.

Studies Using the Belbin Taxonomy

Senior (1997) investigated the informal role, informal role configuration, and team effectiveness links using Belbin's (1981, 1993) taxonomy and her three primary objectives for the study were: (1) determine an individual's "natural" informal role; (2) determine if a team's informal role configuration is balanced; and (3) evaluate the impact of informal role configuration on team performance. Using 11 real management teams from different organizations, the author first assessed the natural informal role for each individual by using Belbin's cut-off score (i.e., 70 points or higher) on the composite informal role score (i.e., combination of the Self-Perception Index and the Observer Scale scores for each role). From there, she labeled a team as "balanced" if it met one of two conditions: (1) each of the nine roles had at least one person that met the 70 or above cut-off; or (2) the average informal role scores across all nine roles were within 20% of each other. The logic underlying the second condition was that: A team's informal role configuration may lack certain natural roles which would suggest it is not balanced; however, if the team's average role scores across roles are similar, then the team is considered balanced.

In order to measure team performance, Senior created a predicted performance rating based on the two measures of team balance and the appropriateness of the team leader's roles in relation to the stage of team development (e.g., identifying needs, making contacts, establishing the organization; Belbin, 1993). The appropriateness of the team leader's roles for a particular stage of development relates to one of Belbin's (1993) assumptions. In essence, Belbin asserts that certain roles are more relevant to specific stages of team development. That is, he predicts that teams will perform better if the team

leader scores highly on key stage roles and if the team, as a whole, scores highly on key stage roles across team members. Because of Belbin's (1993) assumption, Senior's (1997) predicted performance rating is based on the following four components: (1) balance of the team members' strongest role scores, (2) balance of overall role averages, (3) match of key stage roles to the leader's strongest role scores, and (4) match of key stage roles to the strongest overall team average roles scores. Using that information, she evaluated the 11 teams on those four components and arrived at a qualitative judgment of predicted team performance ranging from "poor" to "very good." Next, Senior measured observed team performance. To do this, she interviewed participants and asked them to identify characteristics that differentiate teams based on level of team performance. Using Spearman's rank-order correlation, she found a significant positive relationship between predicted and actual performance ratings but did not report the statistic in her article. Since her predicted ratings of performance were based in part on team balance, she concluded that balanced teams (i.e., well-configured, well-composed) will perform at higher levels. Further, upon reviewing each team's measures of team balance (i.e., balance of team members' strongest roles, balance of overall role average), she observed that some teams' observed performance was high even when only one criterion of team balance was met. Thus, Senior concluded if the team had average role scores that were balanced across members, then not all informal roles had to be naturally represented for a team to be considered balanced.

In recognition of the team balance work of Senior (1997), Partington and Harris (1999) conducted a study with 43 MBA graduate project teams, each consisting of between six to eight individuals. The primary purpose of their study was to investigate

the empirical link between team role balance and team performance. Similar to Senior (1997), the researchers measured team member informal role preference using Belbin's taxonomy. However, unlike Senior's study, they used the original Belbin Team Role Self-Perception Inventory (BTRSPI; Belbin, 1981) measure. Further, Partington and Harris provided team members with their BTRSPI scores and instructed them to formally assign which team member would enact a particular role. Team members were permitted to assign roles in any manner they pleased, and most groups did so in a way that they thought would maximize their project team outputs.

Partington and Harris (1999) used an objective performance measure (i.e., maximum profits in a fixed-cost simulation) because they considered it to be more generalizable to the performance outcome interests of real-world managers. In order to assess the informal role balance of each team, they used three different team role balance indices. The first index assumed that the aggregate informal role scores from all members in a well-balanced team would be evenly spread across all eight informal roles. The second assumed that, in a balanced team, at least one high or very high scoring individual would perform each of the eight distinct informal roles. Finally, the third index assumed a balanced team would only have a single individual scoring high or very high in each of the eight informal roles. The correlations between the three team role balance index scores and team performance were all non-significant. However, the authors also explored the contribution made by the informal role representation (i.e., the number of individuals scoring high to very high for each informal role) in relation to team performance. That is, the exploratory hypotheses were not concerned with balance of roles but, rather, on the impact that the representation of a particular role would have on

team performance. To test these hypotheses, Partington and Harris analyzed informal role configuration vectors that captured the number of people performing each role in a team. For each role, they correlated the number of people per team performing the role with team performance. Of these correlations, all but the Completer/Finisher role had at least a small effect size (i.e., $r > .15$, $r < -.15$). In fact, the relationship between the Coordinator role and team performance had a large negative effect size ($r = -.48$). This implies that team performance tends to decrease as more and more team members adopt the Coordinator role. Thus, this study provides evidence that some informal roles may have main effects on team performance and, conversely, indices of team role balance may not be the best predictors of team performance.

Building upon the work done by Senior (1997) and Partington and Harris (1999), Blenkinsop and Maddison (2007) examined the team role balance to team performance relationship using four different indices of team role balance and a sample of seven British Ministry of Defense teams. Like Partington and Harris (1999), this study used Belbin's original eight role taxonomy as opposed to the more recent nine role version. For the first measurement method, Blenkinsop and Maddison drew on Belbin's (1981) theory of well-balanced teams. Specifically, they argued for a team to be well-balanced, each role must be represented by a person's first or second highest informal role score. The second method of assessing team role balance used a modified version of the methods used by Senior (1997). In this version, a team is considered balanced if all individual informal role scores exceed the cutoff (i.e., 70 percent of the best possible mean score) and the average informal role score falls within 20 percent of the 70 percent cutoff value. With respect to the third index, the authors used Partington and Harris'

(1999) conceptualization of team role balance, which assumes that in a well-balanced team the aggregate informal role scores from all members will be evenly spread across all eight roles. Finally, the fourth index was also borrowed from Partington and Harris (1999). There, the authors argued that, in a well-balanced team, at least one high or very high scoring individual would perform each of the eight distinct informal roles. To measure team performance, participants were first asked to identify characteristics that differentiated teams based on level of performance. Team performance was measured using the same scale anchors for all teams (i.e., very good performance, poor performance, etc.); however, the performance standards for each scale anchor were customized for each team based on the characteristics identified by participants. In terms of results, Blenkinsop and Maddison (2007) did not find significant correlations between any of the team role balance indices and team performance. The lack of significant findings may have been due to inadequate power resulting from a very small sample size (i.e., 7 teams), but in general, the lack of support for variations of team role balance indices is consistent with the findings of Partington and Harris (1999).

Similar to the post-hoc analyses of Partington and Harris (1999), Chong (2007) investigated the contribution each informal role makes toward the explanation of team performance. He used a sample of 342 management students divided relatively evenly into 33 teams. Using the nine-role BTRSPI (Belbin, 1993), the author collected measures of informal role performance after teams had been randomly assembled 8 weeks prior. Each individual's "natural" (i.e., role scores of 70 and above) and "secondary" (i.e., role scores between 30 and 69) role scores from the BTRSPI were averaged across the team for each role. Average role scores for a particular role exceeding the natural and

secondary cutoff scores were counted toward the total number of represented roles and, thus, teams were considered balanced if their role averages exceeded a score of 30 for each role. The higher the number of represented roles, the more well-balanced a team was considered. Given the nature of the management course design, Chong used an objective measure of profits secured over the course of a class simulation. In order to “facilitate analysis by equalizing the effects of minor variations” (Chong, 2007; p. 207), the profit scores for each team were categorized into four levels: (1) low, (2) low average, (3) high average, and (4) high. Results indicated that the Planter ($r = .37$), Shaper ($r = .42$), and Team Worker ($r = .36$) roles were significantly related to team performance rankings suggesting that greater representation of those three roles within a team coincides with greater team performance. In the context of Mumford and colleagues’ (Mumford, 2002; Mumford et al., 2006) integrated taxonomy the Planter, Shaper, and Team Worker correspond to the Creator, Contractor, and Communicator, respectively. The Chong (2007) study lends further support to the notion that certain informal roles may have main effects on team effectiveness when represented in a team’s informal role configuration vector.

In another recent study, Van der Water, Ahaus, and Rozier (2008) assessed informal role balance and its relation to various team performance measures with a sample of 234 undergraduate MBA students randomly assembled into 39 groups. The students were evaluated using Belbin’s (1993) BTRSPI and OAS (i.e., observer checklist) after a 4-week simulation game. To measure team role balance, the researchers used a new index created by Ten Haaf, Bikker, and Adriaanse (2002). The Ten Haaf and colleagues’ index weights roles according to primary, secondary, and tertiary “natural”

role performance classifications. To be considered a naturally performed role, the person has to receive a score of at least 70 on the informal role measure. For individuals performing more than one natural role, the highest natural role score is considered the primary, the second highest is the secondary, and the third highest is the tertiary. If an individual only naturally performs one role, then that role is considered the primary. Weights are then applied to each classification level, where primary natural role performance was rated as five times as important as tertiary role performance and secondary roles were rated as three times as important as tertiary roles. For each team, the weights are applied to the number of people per role classified as primary, secondary, and tertiary with regard to their roles scores. In addition to the Ten Haaf et al. (2002) index of team role balance, the researchers used the previously described team role balance indices developed by Senior (1997) and Partington and Harris (1999).

With respect to team performance, the researchers defined it in terms of process variables (e.g., communication, cohesion) and output variables (e.g., task performance) that resulted from a management decision-making game simulation. Accordingly, they measured performance in the following four ways: (1) simulated game report grade, (2) performance index from the simulation, (3) effectiveness of internal communication, and (4) effectiveness of external communication. The Ten Haaf et al. index of team role balance and its relationship with the simulated game report grade (i.e., a graded assignment in which the team wrote about the strategy, tactics, and learning experiences of the simulation) yielded the study's only statistically significant finding ($r = .28$). Senior's (1997) measure of team balance was not ultimately used because only 4 out of 39 teams would have been considered balanced using that method. The two Partington

and Harris (1999) team balance measures were found to be non-significant for all four performance measures. Thus, when comparing balanced teams versus unbalanced teams in relation to all four constructs of team effectiveness, the researchers found that only the Ten Haaf et al. index demonstrated significant differences between balanced and unbalanced teams—and this was only for the simulated game report grade performance measure. Therefore, the results offer limited support for the Ten Haaf et al. index. Further, consistent with the findings of Partington and Harris (1999) and Blenkinsop and Maddison (2007), other indices of team role balance did not significantly predict team effectiveness.

Similar to Van de Water et al. (2008), Prichard and Stanton (1999) compared the differences in performance between teams with balanced and unbalanced role configurations. To do so, they followed Belbin's (1993) theory that eight roles could be further generalized into four categories: (1) team leaders (i.e., Shaper, Coordinator), (2) creative thinkers (i.e., Planter, Monitor Evaluator), (3) company workers (i.e., Implementer, Completer/Finisher), and (4) negotiators (i.e., Resource Investigator, Team Worker). According to the theory, a team is considered balanced if someone represents a role in each of the four categories. To test this, the researchers divided 48 volunteers from a management recruitment assessment day into 12 teams consisting of four participants. Six of the teams were classified as unbalanced and were made up of four individuals scoring highly on the Shaper role. The reason being, Belbin proposed that a team full of Shapers would be most unbalanced because Shapers tend to be outgoing and high-strung. The remaining six teams were considered balanced because they were comprised of four individuals holding a role in each of the four broad categories: (1) Coordinator, (2)

Planter, (3) Completer/Finisher, and (4) Team Worker. In total, seven outcomes were measured. The first dependent variable was each team's overall score on the "Lost at Sea" decision-making task where team scores were calculated as percentage of the "expert" survivor's score (i.e., the percentage of the highest possible score). The remaining six dependent variables (i.e., number of interactions, number of decisions reached without consensus, number of planning proposals, number of information summaries, number of builds on the ideas of others, number of ideas generated) were measured by two independent observers who watched a videotaped recording of the team interactions. Prichard and Stanton then used Mann-Whitney tests to determine if significant performance differences existed between the balanced and unbalanced teams. They found four of the seven comparisons involving the dependent measures to be statistically significant: (1) scores on the "Lost at Sea" decision-making task were significantly higher for the balanced teams; (2) unbalanced teams composed entirely of Shapers had significantly higher numbers of interpersonal interactions; (3) the all-Shaper teams experienced significantly more failures to reach consensus than the balanced teams; and (4) the number of planning proposals was significantly higher for the balanced teams. Thus, when comparing a balanced four-person team to an unbalanced four-person team of all Shapers, the balanced teams tended to score higher on more measures of team effectiveness. However, this comparison was limited to balanced teams consisting of a Coordinator, a Planter, a Completer/Finisher, and a Team Worker versus an unbalanced team consisting of one specific role.

Higgs, Plewnia, and Ploch (2005) investigated the influence of team context on the relationship between informal role configuration and team performance. Specifically,

they designed a field study to investigate the impact of the team context variable of task complexity. Their sample consisted of 270 employees working in 28 teams at an automotive manufacturing organization. Each team was classified into one of five task complexity categories depending upon the nature of work performed in their jobs. For instance, all teams from the component engineering division were classified as having the second most complex tasks. Trained raters then rated each category across four areas of task complexity (i.e., application of processes, interaction of sub-tasks, typical type of issues, typical type of outcomes) using a 5-point Likert-type scale. The ratings for each task complexity area were first averaged for each team, and then the average team task complexity ratings were averaged across all teams within a category. As a result, each category of task complexity received a numerical rating of task complexity.

Higgs et al. (2005) used Belbin's (1981, 1993) theory of team role balance for teams with fewer than eight members to operationalize informal role configuration. This theory suggests grouping the eight roles into three behavioral focused categories (i.e., ideas, tasks, people) and two team environmental focused categories (i.e., internal, external). Team performance, on the other hand, was operationalized using manager ratings from a questionnaire consisting of six questions addressing different aspects of team performance impressions (e.g., achievement of goals, customer satisfaction, crisis management, etc.). Regression results indicated that low complexity teams tended to perform worse when they had higher team role balance while the opposite was true for high complexity teams. These findings suggest that teams with greater role diversity tend to perform better on high complexity tasks than low complexity tasks. Thus, the

complexity of the task could have important implications for the effectiveness of informal role configurations.

Study Using Bales' Taxonomy

As evidenced by the previous section, several studies have analyzed the links between informal roles, informal role configuration, and team effectiveness using Belbin's (1981, 1993) role taxonomy. In contrast, the following section will review a study that used Bales' (1950) taxonomy of informal roles as a means of investigating the relationship between informal role configuration and team effectiveness. Stewart et al. (2005) operationalized informal roles using Bales' task and social roles categories. In their study, 220 executive MBA students were organized into 45 teams composed of between four to six individuals who interacted for 8 months. To assess the informal roles of each individual, team members completed the SYMLOG Adjective Rating Form (Bales & Cohen, 1979), where each participant rated how frequently (i.e., "never," "rarely," "sometimes," "often," "always") certain descriptors reflected the behavior of his/her fellow team members. The task and social roles dimensions were each calculated by summing 18 behavioral descriptors.

Based on multi-level theory (Kozlowski & Klein, 2000), Stewart et al. (2005) measured team-level informal role configuration via two forms of aggregation. Specifically, they hypothesized that either the *composition* form or the *compilation* form of emergence would predict how individual-level roles aggregate to the team-level and, subsequently, influence team effectiveness. The composition form of emergence is thought to take place when the characteristics of an emergent phenomena are more or less

the same at both a lower-level and higher-level of analysis (Klein & Kozlowski, 2000). For instance, Stewart and colleagues hypothesized that individual-level behaviors associated with the social role category would be conceptually similar to the outcome variable of team-level social cohesion; therefore, they predicted that a composition form of emergence would explain the aggregation from the social role category behaviors to team-level behavior that influence social cohesion. The researchers measured the composition form of emergence by determining the summation of role-consistent behaviors across all team members (i.e., *role amplitude*).

The compilation form of emergence, on the other hand, refers to the emergent processes in which lower-level phenomena combine in a more complex manner to form a higher-level phenomenon with qualitatively different characteristics than the sum or average of the lower-level parts (Kozlowski & Klein, 2000). For example, Stewart et al. (2005) hypothesized that task role category behaviors would be conceptually distinct from team-level social cohesion; for this reason, they predicted that task role category behaviors would aggregate to team-level social cohesion via the more complex form of emergence called compilation. Further, the authors used two different methods to measure the compilation form of aggregation. The first measure of compilation, *role dispersion*, was calculated by determining the variance of rated role-consistency behaviors across all team members. The second measure, *role bloc*, was calculated by determining the skew of the distribution of individual informal role scores within a given team. Team social cohesion and team performance served as outcome variables for the study. Team social cohesion was assessed using a 10-item measure created by Rosenfeld

and Gilbert (1989). Team performance was assessed by averaging the instructor evaluation scores of two team projects.

The results of the Stewart et al. (2005) study suggest mixed support for the authors' hypotheses. The predicted relationship between social role amplitude and team social cohesion was significant ($\beta = .65$), indicating that for every one standard unit increase in social role amplitude, team social cohesion increased by .65 standard units. Similarly, the authors found support for the predicted relationship between task role dispersion and team social cohesion ($\beta = -.27$) in that for every one standard unit increase in task role dispersion, team cohesion tended to drop by -.27 standard units. In addition, social role dispersion strongly influenced team performance ($\beta = -.44$); meaning, team performance scores tended to decrease by .44 standard units for every one standard unit increase in social role dispersion. Finally, the relationship between social role bloc and team performance was significant ($\beta = -.21$), suggesting that for every one standard unit increase in social role bloc, team performance tended to be reduced by .21 standard units.

As for Stewart et al.'s (2005) other hypotheses, the predicted relationships between task role amplitude and team performance as well as the relationship between the skew of task roles and team task performance were all found to be statistically non-significant. Overall, the results lend support to the notion that individual-level task and social roles can be aggregated to form team-level constructs that predict different team outcomes. Furthermore, evidence suggests that social roles aggregate to team-level social cohesion measures via basic summation processes as well as via the within-team skew of individual-level social roles. Moreover, it appears that performance increases as social

roles are more and more consistent rather than if the overall level of role scores is low or high.

Summary

Several studies have investigated the empirical link between informal roles, informal role configuration, and team effectiveness. Of the studies reviewed, the vast majority used Belbin's (1981, 1993) BTRSPI measure and/or OAS measure to calculate informal role performance (i.e., Blenkinsop & Maddison, 2007; Chong, 2007; Higgs et al., 2005; Partington & Harris, 1999; Prichard & Stanton, 1999; Senior, 1997; Van der Water et al., 2008). Many of those same studies operationalized informal role configuration using a vector approach called team role balance that captured the number of people performing each role in a team. The relationship between variations of team role balance and team effectiveness, however, received limited support. In contrast, studies such as Chong (2007) and Partington and Harris (1999) found support that the representation of certain roles may have main effects on team effectiveness. Through a different approach, Stewart et al. (2005) operationalized informal role performance using Bales' (1950) taxonomy and SYMLOG (Bales & Cohen, 1979) measure. Instead of using informal role configuration vectors, Stewart and colleagues kept informal role scores as continuous variables in order to calculate the skew, variance, and mean of teams' informal role scores. As such, they were primarily interested in testing the theory of emergence and how it relates to role aggregation from the individual- to the team-levels. Taken as a whole, evidence from the reviewed studies is suggestive of a relationship between informal roles, informal role configuration, and team effectiveness. However, to

date no study has used Mumford and colleague's (Mumford, 2002; Mumford et al., 2006) integrated taxonomy to explore the relationship.

Personality

The term *personality* refers to an individual's characteristic patterns of thought, emotion, and behavior (Funder, 2001). Theories of personality are primarily concerned with the origins, antecedents, and outcomes of those characteristic patterns of thought, emotion, and behavior. Furthermore, an underlying goal of personality theories is to identify similarities and differences between individuals. In relation to the present study, research findings have indicated that personality predicts individual-level performance (Barrick, Mount, & Judge, 2001; Tett, Jackson, & Rothstein, 1991). Moreover, some studies have explored the relationship between personality and informal role behaviors (e.g., Blumberg, 2001; Stewart et al., 2005). In light of those findings, a secondary focus of the present study will be to investigate further the link between personality and informal roles (refer to Appendix C). In the remainder of this section, I will briefly review theoretical approaches to personality as well as identify the best method of conceptualizing the construct for the present study.

Theories of Personality

From the times of the ancient Greek physician Hippocrates to the present day, the concept of personality continues to capture the attention of philosophers and psychologists. Personality is seen as a fundamental tool for classifying, describing, and differentiating people and, in general, there are at least seven major personality theory

domains: (1) psychodynamic, (2) behaviorist, (3) biological, (4) humanistic, (5) social-cognitive, (6) evolutionary, and (7) trait/type perspective. These seven domains vary to the extent that the *person* (e.g., cognitive and affective processes) or the *situation* (e.g., external environment, stimulus) are viewed as the primary influence of a person's personality (Funder, 2001). Theories heavily emphasizing the person perspective view personality as a stable disposition, whereas theories slanted in favor of the situation view personality as variable across contexts. Despite the different approaches, Funder (2001) argues that the debate over personality as a stable phenomenon has been almost completely resolved. He suggests that personality remains relatively stable across situations and, as a result, should be conceptualized as a trait or type.

Definition

Researchers in the I/O psychology literature commonly define personality in accordance with the *trait/type perspective*. Proponents of the trait/type perspective view personality as relatively stable across situations and, thus, predictable (Funder & Colvin, 1991; Robins et al., 2001). Accordingly, in this approach, the traditional definition of personality is further specified to include the component of cross-situational stability. Therefore, from a trait/type perspective, personality refers to an individual's characteristic patterns of thought, emotion, and behavior (Funder, 2001) that remain relatively stable across situations and time (Funder & Colvin, 1991; Robins et al., 2001).

Personality traits and types are conceptually similar but fundamentally different. Both represent external views of the person rather than fundamental characteristics; meaning, traits and types refer to a person's outward manifestations of consistent

behaviors. In terms of differences, a personality *type* is a qualitative, “all-or-nothing” perspective while a personality *trait* is a quantitative, variable perspective (Funder, 2001). Various type conceptualizations exist, and in general, each operates under the assumption that personality types are dichotomous phenomena. As a result, an individual is categorized as either having or not having a specific type. By operating under an all-or-nothing assumption, personality type ignores the extent to which a person demonstrates or does not demonstrate a particular type. That is, it ignores variations across the type. Therefore, adhering to the type sub-perspective results in a loss of information regarding a person’s personality that, in turn, limits the extent to which one person may be differentiated from another.

In contrast to a personality type, a personality trait varies along a continuum. As such, no two individuals possess the exact same level of a particular trait. This implies that every individual possesses a unique personality. Although two individuals may possess similar amounts of a particular trait, they will not possess the exact same amounts. Therefore, the trait perspective offers greater between-people discriminability than the type perspective.

Different trait/type theories of personality exist in the I/O Psychology literature. For instance, Carl Jung, an early pioneer of the type perspective, proposed that people were either extraverted or introverted (Jung, 1971). Katherine Briggs and Isabel Meyers further elaborated upon Jung’s theory and developed the Myers-Briggs Type Indicator (MBTI). They viewed personality types in relation to four dichotomous pairs: (1) Extraversion/Introversion, (2) Sensing/Intuition, (3) Thinking/Feeling, and (4) Judging/Perceiving (Myers, 1995). Leary (1957), on the other hand, developed what is

known as Interpersonal Theory. He conceptualized personality traits in terms of dyadic compatibility and proposed that the behavior of one individual either promotes or suppresses the behavior of another individual.

More commonly, however, personality traits are described as a series or profile of individual dimensions (Saucier & Goldberg, 2003). In fact, evidence suggests that using a Five Factor Model (FFM) of personality to predict work behaviors and performance yields higher validity coefficients than non-FFM approaches (Salgado, 2003). For that reason, the FFM will serve as the theoretical basis of personality for the proposed study. In the following paragraphs, I will describe how the FFM originated.

Lexical Approach

The FFM of personality is based upon the lexical approach. In every language, there are many terms used to describe a person's thoughts, emotions, and behaviors (e.g., happy, angry, sad). The *lexical approach* suggests that the number of terms relating to a particular concept is an indicator of its importance (Saucier & Goldberg, 2003). Therefore, the purpose of this approach is to identify the underlying similarities between those terms with similar meanings by reducing thousands of terms to conceptually similar groupings called factors. Allport and Odbert's (1936) early work served as a stepping stone toward the FFM. They catalogued nearly 18,000 thousand terms found in the dictionary that referenced thoughts, emotions, and behaviors. Their intention was to identify a few basic dimensions that could be used to describe an individual's personality.

From Allport and Odbert's (1936) extensive list of terms, Cattell (1945) condensed the list into a more manageable form. Using factor analysis, he reduced the list

of nearly 18,000 terms down to 35 underlying dimensions, where each dimension represented a series of core traits. In a later study, Norman (1993) used factor analysis to further reduce the 35 dimensions to five. Although other research before him yielded results consistent with a FFM (e.g., Fiske, 1949; Tupes & Christal, 1961), Norman's five factor labels (i.e., the "Big Five") are used extensively today as a common reference to the five dimensions—albeit with a few small changes. His factor labels are as follows: (1) Extraversion/Surgency, (2) Agreeableness, (3) Conscientiousness, (4) Emotional Stability, and (5) Culture. Although there is not unanimity on these labels, the Extraversion/Surgency factor is, today, known simply as Extraversion while the Culture factor is sometimes referred to as Openness to Experience or Intellect. Subsequent researchers (Digman, 1990; McCrae & Costa, 1985, 1987) have used similar factor analytic techniques that support the Big Five dimensions presented by Norman (1963).

Despite the similarities in factor structures within the English language, it is important to note that the lexical approach to personality does not necessarily yield universal dimensions across cultures and languages. For instance, studies of northern European languages such as English, German, and Dutch have resulted in Big Five dimensions that are structurally similar but not completely identical (Hofstee, Kiers, de Raad, Goldberg, & Ostendorf, 1997). Other results indicate more pronounced structural differences between studies of the Greek (Georgiades, Tsaousis, & Goldberg; 2005) and Filipino (Church, Reyes, Katigbak, & Grimm, 1997) languages. Thus, special care must be taken when generalizing the factor structures that result from a lexical approach.

For the most part, the Big Five dimensions are assumed to be relatively independent (McCrae & Costa, 1985). That is, the extent to which a person possesses one dimension should not typically influence the extent to which the same person possesses another. Furthermore, each of the five dimensions represents a number of core characteristics (Barrick & Mount, 1991; Digman, 1990; McCrae & Costa, 1985, 1987). The first dimension, *Agreeableness*, refers to an individual's behavioral tendency to be compassionate and cooperative, and core characteristics include being cooperative, likeable, friendly, and good-natured. A person high in *Conscientiousness* tends to act respectfully and dutifully in a planned and courteous manner and, as a result, may be described as achievement oriented, responsible, and organized. *Extraversion*, on the other hand, refers to a person's tendency to seek interaction and stimulation from others. Core characteristics of an extraverted person include: sociability, assertiveness, talkativeness, and ambitiousness. *Emotional Stability* is defined as a person's tendency to feel emotionally calm and secure. However, Emotional Stability is often described by its negative pole called *Emotional Instability* or *Neuroticism*. An emotionally instable person tends to experience relatively frequent fluctuations in emotion. Core characteristics of Emotional Instability include feelings of anger, depression, anxiety, and vulnerability. Finally, *Openness to Experience* is a bit more difficult to define but typically refers to an individual's appreciation of new and diverse ideas, environments, situations, and people. As such, Openness to Experience includes core characteristics like being curious, imaginative, broad-minded, and intelligent. Together, these five dimensions make up what is commonly referred to as the Big Five. In the following section, I will review

studies that have investigated the empirical link between the Big Five dimensions of personality and informal roles.

Link Between Personality and Informal Roles

The secondary purpose of the current study is to investigate the link between personality and informal roles (see Appendix C). Recall that informal roles refer to an individual's situation-specific patterns of similar behaviors that emerge during team interaction (Forsyth, 1998; Mumford et al., 2008; Stewart et al., 2005). Past research has shown that personality predicts individual behavior and performance (e.g., Barrick et al., 2001; Tett, et al., 1991). As such, the extent to which an individual possesses a given personality dimension may influence which informal roles he or she adopts. In the following paragraphs, I will review three studies that have investigated the relationship between the Big Five dimensions of personality and the adoption of informal roles.

In order to better understand the relationship between personality and team interactions, Blumberg (2001) calculated the correlations between the Big Five, Big Seven, and Bales' (1950, 1979) social and task role categories using a sample of 207 undergraduates. To measure personality, Blumberg used both the Big Five and the Big Seven (i.e., the Big Five plus the dimensions of Positive Valence and Negative Valence). He measured informal roles by instructing participants to complete the self-report measure called SYMLOG Expect (Bales & Cohen, 1979), which directs participants to indicate how they believe others would rate them along 12 of the behavioral dimensions. The 12 ratings are then summed along the task role and the social role categories. The resulting scores indicate the extent to which each individual performed behavior related

to the two role categories. As described in the Informal Roles section, role categories are the broad overarching categories that encompass informal roles. As the labels imply, the task role category includes those informal role behaviors that pertain directly to the team's task. The social role category includes those informal role behaviors that indirectly contribute to task-related behaviors by facilitating the social and emotional environment of the team.

In Blumberg's (2001) results, the task role category correlated significantly with Agreeableness ($r = .23$) and Conscientiousness ($r = .41$). The social category role, on the other hand, correlated significantly with Agreeableness ($r = .45$), Conscientiousness ($r = .24$), Extraversion ($r = .26$), and Neuroticism ($r = -.42$). The additional Big Seven dimensions of Positive Valence and Negative Valence did not correlate significantly with either the task role category or the social role category. With respect to the significant findings, it is possible that the correlation effect sizes are inflated because the study did not require participants to reference a specific team setting when completing the informal role measure. Consequently, the measure may have assessed *stable* behavioral tendencies that are more consistent with the definition of personality when attempting to measure informal role performance. As a result, the measured correlations were likely higher than if the correlation between a stable construct and a situation-dependent construct had been measured. Thus, the study illustrates the importance of providing a specific team context when measuring informal roles.

As described previously, Stewart et al. (2005) provided support for the theory that informal roles serve as linking mechanisms between individual traits and team outcomes. Recall that in their team-level hypotheses, they assessed the relationship between

informal role configuration and team effectiveness. However, in addition to the team-level hypotheses, they predicted an individual's personality dimensions would correlate significantly with the informal roles he or she adopted. To review, the study participants were 220 executive MBA students organized in 45 teams, where each team consisted of 4-6 individuals working together throughout an 8-month period. The researchers used the NEO-FFI (Costa & McCrae, 1992) self-report measure described previously to measure personality and the SYMLOG Adjective Rating Form (Bales & Cohen, 1979) to measure informal role performance. This measure differs from the SYMLOG Expect measure used in the Blumberg (2001) study. Instead of asking participants to anticipate how others would rate them, the SYMLOG Adjective Rating Form instructs participants to rate other team members.

In terms of results, Stewart et al.'s (2005) predictions received mixed support. Agreeableness and the social role category were found to be significantly correlated ($r = .25$), suggesting Agreeableness was moderately related to performing the social role category. The relationship between Conscientiousness and the task role category was also significant ($r = .25$), suggesting there is a positive moderate relationship between a person's level of Conscientiousness and the extent to which he or she performs the behaviors associated with the task role category. Furthermore, the relationship between Neuroticism (i.e., the negative pole of Emotional Stability) and the task role category ($r = -.15$) was found to be significant as well, albeit small. This means that an emotionally unstable person will tend *not* to perform behaviors in the task role category. Finally, the correlation between Openness to Experience and the task category role received mixed support in that the zero-order correlation was significant ($r = -.16$), but the beta-

coefficient was not significant in a regression analysis controlling for the effects of the other personality variables.

During their post-hoc analyses, Stewart et al. (2005) noted two significant unhypothesized correlations. First, Openness to Experience was slightly related to the social role category ($\beta = -.15$), which indicates that for every one standard unit increase on the Openness to Experience dimension, scores on the social role category tend to decrease .15 standard units. Second, the relationship between Extraversion and the task role category yielded a small, negative effect ($r = -.13$), suggesting that people with low levels of Extraversion are more likely to perform behaviors in the task role category than people with high levels of Extraversion.

In summary, the results of Stewart et al.'s (2005) study provided some support for their a priori hypotheses. The relationships between Agreeableness and the social role category and Conscientiousness and the task role category yielded the largest effect sizes of the hypothesized relationships (i.e., $r = .25$ for both). To a lesser extent, Extraversion is related to the task role category. Finally, the hypothesized relationship between Openness to Experience and the task role category receive mixed support. Appendix E presents the correlations between each of the five personality dimensions and the two role categories.

In contrast to Stewart et al. (2005), Mumford et al. (2008) did *not* directly hypothesize that personality influences the adoption of informal roles. Nevertheless, they presented correlations between the Big Five and task, social, and boundary-spanning role categories (see Appendix F). Their data are based upon a sample of academic project teams of 4-5 members drawn from 93 undergraduate students. The authors used the IPIP

(Goldberg, 1999b) 50-item equivalent of the NEO-FFI (Costa & McCrae, 1992) as a measure of the Big Five personality dimensions. As for informal role performance, they used their own Team Role Performance (TRP) test (Mumford, 2002; Mumford et al., 2006; Mumford et al., 2008). Two of the correlations were found to be significant. Agreeableness was moderately related to performing behaviors associated with the social role category ($r = .32$), indicating that people high on the Agreeableness dimension tend to perform roles that facilitate a team's socioemotional environment. Also, Emotional Stability was found to be moderately and negatively related to a person's performance on behaviors of the task role category ($r = -.21$). This negative relationship suggests that emotionally stable people tend *not* to adopt roles that contribute directly to a team's task performance.

In summary, I reviewed three studies that investigated the relationship between the Big Five personality dimensions and informal roles (Blumberg, 2001; Stewart et al., 2005; Mumford et al., 2008). In general, the studies lent further support to the theory that informal roles serve as a linking mechanism between individual traits and team outcomes (Katz & Kahn, 1978; Stewart et al., 2005). Specifically, these three studies investigated the individual-level relationship between personality and informal roles. Results indicated that some personality dimensions tend to predict behaviors consistent with either the task role or social role categories. With that said, the studies have their limitations and, as a result, special attention should be paid to elements of construct operationalization and methodological design. For example, Blumberg (2001) operationalized informal roles in a way that is not consistent with the present study (i.e., he did not measure informal roles for a specific team context). Thus, the inferences drawn from that study would not be

valid in the context of the present study. The other two studies defined and operationalized informal roles in a manner consistent with the present study, but both used role categories (i.e., task, social) instead of specific informal roles. Because of this, only general inferences can be drawn about the relationship between specific informal roles and personality.

To pull together the overall findings across the Stewart et al. (2005) and Mumford et al. (2008) studies, I conducted a bare-bones meta-analysis (i.e., summed weighted effect size based on sample size). Three of the meta-analyzed effect sizes exceeded the threshold of a small effect (i.e., $r > .15$, $r < -.15$). Across the two studies, there was a positive, moderate effect between Agreeableness and the social role category ($r = .28$). Small to moderate effects were found between Conscientiousness and the task role category ($r = .21$) as well as between Emotional Stability and the task role category ($r = -.17$). The results of the bare-bones meta-analysis have important implications for the present study's hypotheses. Using these results as a guide, hypotheses developed for this study will investigate the relationship between specific Big Five personality dimensions and specific informal roles from the Mumford role taxonomy (Mumford, 2002; Mumford et al., 2006).

Present Study

As described previously, the conceptual framework for the proposed study involves two levels of analysis: the individual- and the team-level (refer to Appendix A). The primary focus of this study is the team-level relationship between informal role configuration and team effectiveness (refer to Appendix B), and the secondary focus is

the individual-level relationships between personality and informal roles (refer to Appendix C). In the following section, I will describe my predictions for both sets of hypotheses.

Team-Level Hypotheses

In general, I hypothesize that differences in informal role configuration will influence team effectiveness. That is, informal role configuration is hypothesized to affect team processes (e.g., norms, communication, coordination, decision-making, cohesion) that, in turn, affect team task performance. Therefore, the team-level hypotheses refer to the relationship between informal role configuration and team effectiveness. Furthermore, the hypotheses are grouped into four categories: (1) linear relationships, (2) curvilinear relationships, (3) monotonic relationships, and (4) interactions. The first three categories of hypotheses represent main effects whereas the fourth represents interaction effects.

Linear

The following hypothesis category represents a traditional bivariate linear relationship. It suggests that some informal roles may be additive and will, thus, provide value to the team regardless of what other roles are performed. For a role to be considered additive, people performing the role must directly influence successful task completion. Further, the behaviors in such roles are additive in that each additional person performing the role will provide incremental value to the team in terms of

effectiveness. Therefore, I predict that team effectiveness will improve as more team members adopt these role roles.

Those performing the Completer role take personal responsibility for completing different aspects of the task and following through with those commitments.

Furthermore, once critical task information is shared, the Completer may work independently toward fulfilling commitments. Consequently, as more team members adopt the Completer role, their individual outputs should contribute directly toward successful task completion. As such, I predict:

Hypothesis 1a: The number of Completers on a team will be positively related to team effectiveness.

Contractors coordinate and organize team task activities in order to complete the task on time, in the right order, and in an efficient manner. Thus, Contractors provide useful structure to the team that aids in task completion. Teams with more people performing such behaviors should perform better than teams with few to no people performing them because people performing this role direct team activities toward successful task completion. The underlying logic for this hypothesis is as follows: team activity needs direction and focus (Swezey & Salas, 1992). Furthermore, Partington and Harris (1999) used Belbin's (1981, 1993) role taxonomy to predict team effectiveness and found a strong linear relationship between the number of Coordinators and the outcome variable ($r = .48$). In another study, Chong (2007) found a moderate-strong relationship between Belbin's Shaper role and team effectiveness ($r = .42$). When integrating the various role taxonomies, Mumford and colleagues (2002, 2006) classified Belbin's Coordinator and Shaper roles in the same conceptual category as what they later

labeled the Contractor role. Therefore, given these previous findings and the underlying logic, I predict:

Hypothesis 1b: The number of Contractors on a team will be positively related to team effectiveness.

Creators consider the “big picture” and develop creative solutions to problems and creative approaches to successful task completion. As such, Creators offer unique decision-making alternatives and, thus, contribute to team effectiveness. Considering the nature of the role, I predict that increasing numbers of decision alternatives and creative approaches to problems will increase a team’s capability to successfully complete a task. In support of this prediction, Chong (2007) found the relationship between Belbin’s (1980, 1993) Planter role and team effectiveness to be moderately strong ($r = .37$). In Mumford and colleague’s (2002, 2006) integrated taxonomy, the behavior clusters associated with the Planter were labeled as the Creator. For the aforementioned reasons, I predict:

Hypothesis 1c: The number of Creators on a team will be positively related to team effectiveness.

Curvilinear

The following hypothesis category represents curvilinear relationships between informal role configuration and team effectiveness. The name of this category signifies that an optimal amount of a specific role will result in the greatest team effectiveness. Moreover, if such roles are underrepresented or overrepresented team effectiveness will decline. Like the linear relationship hypothesis category, roles must meet two criteria to

be included in this set of hypotheses. The first criterion is the same as the linear relationship category in that the role must directly contribute to successful task completion. To meet the second criterion, however, the role must at some level include behaviors that ultimately diminish effectiveness. That is, the behaviors performed by someone in the role will, in larger amounts, overwhelm the team or become the source of conflict.

To some extent, Critics serve as “Devil’s Advocates” which means that they openly critique potential problems. Specifically, Critics honestly discuss the pros and cons of proposed decisions and, thus, guard against unquestioned consensus during team decision-making as they prod the team to evaluate decisions. Teams with too many Critics will address decision-making problems without providing alternatives. Therefore, I predict that too many Critics will overwhelm a team with critiques without contributing to alternative approaches to task completion. With that said, teams without a Critic will not benefit from the positive aspects of behaviors associated with evaluation and critique. For these reasons, I predict:

Hypothesis 2: Informal role configurations with one Critic will result in greater team effectiveness when compared to teams with less than one or more than one Critic.

Monotonic

This hypothesis category consists of monotonic predictions. For some roles, I hypothesize that teams will receive the same benefit with one team member performing the role as they would with multiple team members performing the role. That is, the mere presence of a role should result in greater team effectiveness compared to teams with no

one adopting the role. I predict roles with a monotonic influence on team effectiveness will be indirect contributors to task completion in that they should facilitate the social and emotional environment of the team (i.e., social role category behaviors). Accordingly, only a minimum threshold of social and emotional support should be needed to encourage effective information sharing. As long as team members act civil to each other, the team should be able to work toward successful task completion. Thus, to achieve greater team effectiveness, I predict only one person will be needed to encourage a positive social environment; however, more team members filling such roles will neither diminish team effectiveness nor an incrementally increase it.

Calibrators reduce or eliminate team conflict by suggesting positive ways to interact (e.g., taking turns, showing respect, being open to new ideas) and intervening when there are social interaction difficulties. Therefore, in terms of effectiveness, teams should be better when at least one Calibrator is represented. However, team effectiveness should not linearly improve as more team members adopt the role; rather, the slope of the relationship should plateau to zero once one Calibrator is present. The logic being, only a threshold of cohesion and civility should be needed for a team to effectively share task-related information and collaborate. Thus, only one person is needed to recommend ways to interact more effectively.

Hypothesis 3a: Teams with at least one Calibrator will have greater team effectiveness than teams without a Calibrator; however, team effectiveness will not significantly improve when more than one Calibrators are represented.

Communicators contribute to a pleasant work environment where communication is encouraged and personal feelings and thoughts are respected. As such, teams with Communicators represented should contribute to greater cohesion, which should allow team members to work together more efficiently and effectively toward successful task completion. Like teams with at least one Calibrator, teams with at least one Communicator should perform better than teams without a Communicator. However, the each additional Communicator should not increase or decrease team task performance. The logic behind this hypothesis follows that of Hypothesis 3(a) in that only a threshold of social cohesion and civility should be necessary for effective information sharing and collaboration.

Hypothesis 3b: Teams with at least one Communicator will have greater team effectiveness than teams without a Communicator; however, team effectiveness will not significantly improve when more than one Communicators are represented.

Interaction

The final category of hypotheses refers to informal role configurations in which the presence of two particular roles has an interaction effect. In other words, the relationship between informal role configuration and team effectiveness should contain a multiplicative effect when both roles are represented. As stated previously, I predict that the relationship between the number of Critics and team effectiveness will be curvilinear. However, I hypothesize that the curvilinear relationship will not hold true when greater numbers of Creators are represented in a team's informal role configuration. As more

Creators provide more unique decision alternatives, an increasing number of Critics will be needed to evaluate those alternatives. Therefore, I predict:

Hypothesis 4: The number of Creators and Critics on a team will interact such that the relationship with team effectiveness will increase linearly for each additional Creator and Critic represented in a team.

Individual-Level Hypotheses

These hypotheses refer to the individual-level links between personality and informal roles (see Appendix G for a visual representation of the hypothesized relationships). As such, I hypothesize that the dispositional nature of the Big Five personality dimensions will influence the adoption of situation-dependent informal roles within a team. With regard to the following hypotheses, I predict specific dimensions of the “Big Five” will be related to the adoption of specific informal roles.

In general, Conscientiousness individuals tend to act respectfully and dutifully in a planned and courteous manner. Because of this, individuals higher in Conscientiousness should be more likely to perform the planning behaviors associated with the Contractor role (e.g., organizing and coordinating team task activities) when compared to individuals with lower levels of Conscientiousness. Furthermore, courteousness, a characteristic of Conscientiousness, appears to be conceptually related to the behavior patterns of the Completer role (e.g., following through on commitments, taking responsibility for task completion). Therefore, I hypothesize that a person’s level of Conscientiousness will influence the likelihood that he or she performs the Completer role.

Hypothesis 5a: One's level of Conscientiousness will be positively related to the adoption of the Contractor role.

Hypothesis 5b: One's level of Conscientiousness will be positively related to the adoption of the Completer role.

People high in Extraversion tend to seek interaction with others and, as a result, will be more likely to speak out to other team members to make their position known. Similarly, those performing the Contributor role speak out to make their task-relevant knowledge or expertise known to the team, while those performing the Critic role speak out to critique and evaluate team decisions. Conversely, people low in Extraversion should be reluctant to speak out even if they have the requisite knowledge or have a useful critique. Therefore, I predict that a person's level of Extraversion will influence the likelihood that he or she performs the Contributor and Critic roles.

Hypothesis 5c: The level of Extraversion will be positively related to the adoption of the Contributor role.

Hypothesis 5d: The level of Extraversion will be positively related to the adoption of the Critic role.

As the name implies, individuals high in Openness to Experience are open to a variety of experiences (e.g., situations, people, environments, ideas). In a similar fashion, team members performing the Creator role should be open to new experiences because they offer new ideas and solutions to the team. Furthermore, the creative ideas and solutions offered by the Creator suggest evidence of intellect, which is another characteristic of Openness to Experience. The Calibrator role, on the other hand, reduces team conflict by proposing positive interventions such as encouraging openness to the

ideas of others. For these reasons, I predict that a person's level of Openness to Experience will influence the likelihood that he or she adopts the Creator and Calibrator roles.

Hypothesis 5e: The level of Openness to Experience will be positively related to the adoption of the Creator Role.

Hypothesis 5f: The level of Openness to Experience will be positively related to the adoption of the Calibrator role.

Emotionally instable (i.e., the negative pole of Emotional Stability) individuals tend to exhibit behaviors such as anger, depression, anxiety, and vulnerability. As a result, team members with lower levels of Emotional Stability should be less likely to perform the Communicator role, and team members with higher levels should be more likely to perform the role. That is, it is likely be difficult to perform the behaviors necessary to facilitate a positive social and emotional environment when a person has a tendency to experience negative emotions. Thus, a person's level of Emotional Stability should influence the likelihood that he or she performs the Communicator role.

Hypothesis 5g: The level of Emotional Stability will be positively related to the adoption of the Communicator role.

People high in Agreeableness tend to perform behaviors that are compassionate and cooperative in nature. Likewise, people performing the Communicator and Calibrator roles tend to demonstrate compassionate and cooperative behaviors as they encourage a positive socioemotional environment with the team. For these reasons, I hypothesize that team members' level of Agreeableness will positively influence the probability that they adopt the Communicator and Calibrator roles.

Hypothesis 5h: The level of Agreeableness will be positively related to the adoption of the Communicator role.

Hypothesis 5i: The level of Agreeableness will be positively related to the adoption of the Calibrator role.

Appendix B: Task Materials**GENERAL MEMO**

To: Vice-President, Script Evaluation
 Vice-President, Industry Research
 Vice-President, Talent Appraisal
 Vice-President, Marketing

From: Stan Friedman, CEO

RE: Choosing films for production next year

Thanks for agreeing to meet on such short notice. As usual, the task in front of you is one of picking the movies that we will produce and release in the upcoming year. The fiscal solvency of our studio is riding on the decisions you make. Pick the best movies and we (as well as our stockholders) will be swimming in profit; pick the wrong ones and we may go belly up.

As you all know, profit from the movies we make is determined by taking the revenue earned by each film and subtracting its cost:

$$\text{Movie Profit} = \text{Movie Revenue} - \text{Movie Cost}$$

Movie cost is estimated by adding the production cost (which is fixed) to the marketing cost (which is under our control):

$$\text{Movie Cost} = \text{Production Cost} + \text{Marketing Cost}$$

Movie revenue is estimated by multiplying the number of viewers by the average ticket price for a particular film:

$$\text{Movie Revenue} = \# \text{ of Viewers} * \text{Average Ticket Price}$$

As you are well aware, the number of viewers for any given film depends on five main factors: (1) Viewer Appeal, (2) Movie Quality, (3) Marketing, (4) MPAA rating, and (5) Average Ticket Price. *Viewer Appeal* is basically a function of popular interest in the film's content (i.e., setting, plot, special effects), as well as the popularity of the talent involved (i.e., director and actors/actresses). *Movie quality* is a function of the script quality, director's skill, and actor/actress' skill. All of these things interact with one another, and each one is important. If a movie has a good script and good actors/actresses but a terrible director, the movie will not be very good. Similarly, if a movie has a good director and good stars but a poor script, it will also be bad. It probably goes without

saying that a movie that is poor in all three categories will just plain stink. *Marketing* obviously increases public awareness of our movie, and the *MPAA rating* constrains the size of our audience base. The *average ticket price* reflects the age of the average viewer and, to a certain extent, the time of day that the typical viewer goes to see the movie. Movies with the highest average ticket prices draw mostly adults who go to see the movie in the evening; movies with lower average ticket prices attract younger viewers and people who go when matinee prices are in effect. ***The point here is that all five factors must be considered when estimating how much revenue a film will bring in..***

Our spending allowance for this year is \$150 million. It's hard to tell from a brief summary how much a film is going to cost because it depends on many factors, including star salaries, shooting location and duration, and special effects. However, our screenplay reviewers are pretty good and the estimates they provide should be very close.

I would like you to examine the information at your disposal and figure out how to spend our \$150 million to maximize total profit for the year. As usual, I don't care if you spend the \$150 million on one blockbuster or divvy it up over 10 little art-house projects – just figure out the ones that will bring in the most profit. While a film's total revenue is important, keep in mind that it's return on investment that is critical. *In other words, the most important value to estimate is a potential film's profit divided by its cost (i.e., profit/cost, or profit ratio). Profit ratio reflects the number of dollars of profit we get for every dollar we spend.* A good film will end up making about twice as much as it cost (including marketing), and a great film may end up making three to four times as much.

And don't bother trying to save any money – it's there to be spent, so use as much as you can.

I know that picking movies isn't an easy task, but do the best you can. Your staffs have provided you with a good deal of useful information, and I think our screening team has identified a good set of potential choices for you. Feel free to use your personal experiences and gut feelings, but let the hard numbers provided by our research team have the final say. I look forward to seeing your recommendations on my desk next week. Good luck!

MEMO

To: Vice-President, Industry Research

From: Industry Research Staff

RE: Viewer Appeal ratings

Here is the market research that you requested on potential movies for next year. We pulled together 10 focus groups as usual to get this data. Each focus group was led by someone on our staff and involved a roundtable discussion of the movie's premise and cast, plus formal ratings of content and star appeal by each member of the focus group. We gave the focus groups the same movie capsules that your committee is using to make your decisions. See Table 1 for a summary of the findings from the focus group research.

Table 1 contains two separate estimates of a film's appeal based on its *content* and *stars*. We asked people in the focus group to discuss (and rate) Content Appeal and Star Appeal separately. **Content Appeal** concerns a movie's premise, plot, character development, and special effects; the film's genre and emergent themes play a role as well. **Star Appeal** has to do with the popularity of the actors/actresses as well as the director. Industry research suggests that content is roughly twice as important as stars in determining who goes to see a movie, so we scaled Content Appeal values from 0-200, and Star Appeal values from 0-100. Basically, a Content Appeal score of 200 means that the movie should have a very broad demographic appeal and the focus group participants were dying to see the screenplay get turned into a movie. In contrast, a Content Appeal score of 0 means that no one was interested in seeing the movie get made based solely on its subject matter. A Star Appeal score of 100 means that basically every role in the film has A-List stars that people want to see; a score of 0 means that the cast is essentially unknown to the audience. Star Appeal is based on physical attractiveness, charisma, and the success of recent films and has little to do with talent – it only reflects “popular demand.”

Films with unusual situations and big-name stars tend to have more appeal to viewers. In particular, action/adventure, war, science-fiction, and suspense films tend to interest people more than dramas or comedies. Animated films almost always do well with families and often become blockbusters – they have a built-in audience if based on a book or story familiar to the audience. Horror movies do well with males (especially younger ones) and some pull in women as well. Comedies do well if the situation is right and the casting is good. Dramas are the most variable; they tend to draw discriminating viewers from all groups, but usually have much lower content appeal because their situations are more ordinary. More importantly, movies with lots of special effects are very attractive regardless of their genre – in part because of extensive repeat viewing.

To summarize, the Content Appeal and Star Appeal values quantify the appeal of a film based on its subject matter and cast, respectively. **A good overall index of the “buzz” surrounding a potential movie is to add up its Content Appeal and Star Appeal.**

Table B.1 Year 1 Focus Group Research on Viewer Appeal of Potential Movies.

Movie Title	Content Appeal	Star Appeal	Staff Comments
Rikki-Tikki-Tavi	200.00	75.00	Families will eat this stuff up; the famous mongoose is loved by all. Focus groups liked the voices.
Light Years	185.00	30.00	Offbeat science fiction story from an A-list director. Story is intriguing, and will have great special effects.
Chosin Reservoir	150.00	50.00	Older viewers were intrigued by the history; younger viewers liked the realistic battle scenes.
Degeneration	130.00	55.00	Everyone loves a good zombie pic. Should provide nice mix of humor and special effects.
Renegade	130.00	80.00	A modern update of <i>Invasion of the Body Snatchers</i> . The huge <i>X-Files</i> fan base will love it, especially with Jessica Alba.
Rio	110.00	45.00	Mystery involving sex, murder, corruption – and the President. Should appeal to older viewers.
Sex Ed	80.00	40.00	Sex in the schools is a perfect target, and focus groups responded well. No headliners, but good cast.
Southern Accents	75.00	30.00	Gritty realism – story appealed more to women, but men really liked Eliza Dushku.
Fast Food	70.00	70.00	Spoof of typical fast food joint scored about average on content; perfect casting in this one.
A Lifetime of Anger	65.00	45.00	A biting tragedy; this may be the tear-jerker of the year. No major female roles hurts appeal some.
On Campus	50.00	0.00	Documentary-style exploration of college life. Viewer appeal will be somewhat limited to older teens and young adults.

Table B.2 Year 2 Focus Group Research on Viewer Appeal of Potential Movies.

Movie Title	Content Appeal	Star Appeal	Staff Comments
The Reactor	190.00	95.00	This looks like a can't-miss summer blockbuster – great special effects and all-star cast.
We, The People	180.00	80.00	The war on terrorism takes an Orwellian turn after a U.S. city is nuked. Popular cast and knock-out special effects. Very timely.
Oil & Water	170.00	70.00	There is a huge market out there for this kind of film. A 21 st century take on <i>The Parent Trap</i> .
Air Cav	160.00	55.00	Sort of <i>Black Hawk Down</i> set in Vietnam – above average cast; very realistic.
Welcome to My Room	150.00	50.00	Spoof of suburbia and documentaries seen through the eyes of a kid. Nice supporting cast.
Line of Duty	140.00	100.00	An action flick with a twist – focus groups were drooling over the cast.
Extrapolation	115.00	35.00	Hot topic due to popularity of “Diablo” computer game. Should bring out the teens.
The Devil Made Me Do It	115.00	25.00	Chilling mystery that had focus groups intrigued; no-name cast, though.
The Wolf's Lair	100.00	65.00	Interesting mix of war, suspense and character study with solid casting, but some viewers will know the outcome.
Hoover	95.00	85.00	Most people don't know who J. Edgar Hoover is, but an outstanding cast.
A Good Day to Die	60.00	85.00	Sounds like a real downer, but Ang Lee, Tom Hanks, and Jennifer Connelly will bring in a lot of viewers.

MEMO

To: Vice-President of Script Evaluation

From: Script Evaluation Staff

RE: Script Quality ratings for potential movies

Here is the information you requested regarding the movie screenplays that were sent to us for evaluation. We generated quality ratings by having two of our most experienced readers go through each screenplay and assign a rating on a scale of 1 to 10, then we averaged the ratings.

When we made our ratings, as always, we paid attention to the quality of the dialogue, plot coherence, pacing, and factors appropriate to each type of movie. For example, for dramas we considered character development and plot twists, whereas for science fiction films we looked for a unique vision of the future and a realistic extrapolation from current society. In other words, we took into account that what makes one kind of movie good is not necessarily the same thing that makes another kind of movie good.

We don't have to tell you that Script Quality is very important to the success of a movie – everything is riding on it. We can have all the big-name stars we want but if the script is terrible, it's not going to make back the money needed to pay all those stars! Make sure the other execs realize this.

Table B.3 Year 1 Script Quality Ratings and Expected MPAA Ratings for Potential Movies.

Movie Title	Script Quality	Expected MPAA Rating
Degeneration	10	PG-13
On Campus	10	R
Southern Accents	10	R
Fast Food	9	PG
Sex Ed	8	PG-13
Rio	8	R
Chosin Reservoir	7	PG-13
Light Years	7	PG
Renegade	6	PG-13
Rikki-Tikki-Tavi	5	G
A Lifetime of Anger	4	PG-13

Table B.4 Year 2 Script Quality Ratings and Expected MPAA Ratings for Potential Movies.

Movie Title	Script Quality	Expected MPAA Rating
The Wolf's Lair	10	PG-13
Extrapolation	9	PG-13
Welcome to My Room	9	PG
The Devil Made Me Do It	8	R
We, The People	8	PG-13
A Good Day to Die	7	PG-13
Hoover	7	PG
Line of Duty	6	PG-13
The Reactor	6	PG-13
Air Cav	5	PG-13
Oil & Water	3	G

MEMO

To: Vice-President, Talent Appraisal

From: Talent Appraisal Staff

RE: Skill Ratings for Actors, Actresses, and Directors

We were finally able to compile the information regarding actor and director skill values. It took quite a bit of work, but we now have the data you requested.

Basically, we surveyed a panel of movie critics and asked them to rate a list of actors, actresses, and directors for their professional skill. For directors, we asked the critics to consider things like artistic vision, ability to inspire actors and actresses, work ethic, and capturing the “feel” of situations. For those in front of the camera, skill consists of raw acting talent, intensity, emotional expressiveness, and range.

Director Skill pertains to the ability of a director to create a unified artistic vision and get the most out of the actors and actresses. Director ratings were made on a scale of 1-10, with 1 indicating a true hack with no talent and 10 indicating a director who could make an Oscar-winner with volunteers from regional theater. Some of these ratings may surprise you. Acting Skill is primarily a function of an actor/actresses’ ability to credibly display a range of emotions. Some actors/actresses are very good in limited roles, but the truly great ones can yearn, pine, lust, cry and rage with amazing ability. Actors and actresses are rated on a 5-point scale, with 1 indicating an actor/actress who would be challenged to do well on a soap opera and 5 indicating an actor/actress that can do any role with convincing authority.

With regard to how the Acting Skill of the various actors/actresses affects the overall Acting Quality of the movie, here is what our research seems to suggest:

- (1) The Acting Skill of supporting actors can pretty much be ignored – these people are usually not on screen long enough for their flaws to do much damage.
- (2) Acting Quality can be estimated by averaging the Acting Skill ratings for the Lead Roles. When there are only two lead roles, however, it’s actually a little less than average if there is a large discrepancy in the Acting Skill values of the leads. In other words, the lesser actor weighs the film down.

Table B.5 Director Skill Ratings

Director	Skill Rating (0-5 stars)
John Carpenter	3.5
Chris Columbus	2
Stanley Eider	3
Nora Ephron	4
Milos Foreman	4.5
William Friedkin	3
Jonathan Glazer	3.5
Ron Howard	4
Jean Jacques-Annaud	3.5
Stephen King	2.5
Neil LaBute	4
Mimi Leder	3.5
Ang Lee	5
Barry Levinson	4
Michael Mann	4
Garry Marshall	3.5
John McTiernan	4
Sam Mendes	3.5
Mike Nichols	4
Wolfgang Peterson	3.5
Sam Raimi	3
Harold Ramis	3
Brett Ratner	2
Ivan Reitman	2.5
George Romero	3
Joel Schumacher	1.5
Ridley Scott	5
Bryan Singer	2.5
Steven Soderbergh	5
Oliver Stone	5
Billy Bob Thornton	3.5
Simon West	2
Robert Zemeckis	4.5

Table B.6 Acting Skill Ratings for Lead Actors (0-5 Stars)

Actor/Actress	<i>Skill</i>	Actor/Actress	<i>Skill</i>	Actor/Actress	<i>Skill</i>
Ben Affleck	3 ½	Josh Hartnett	3	Freddie Prinze, Jr.	3
Jessica Alba	3 ½	Ethan Hawke	3 ½	Dennis Quaid	3 ½
Kevin Bacon	4	Katie Holmes	3	Daniel Radcliffe	3 ½
Alec Baldwin	4 ½	Jeremy Irons	4 ½	Len Randall	4 ½
Tom Berenger	4	Samuel L. Jackson	4	Christina Ricci	5
Halle Berry	3 ½	Angelina Jolie	3	Denise Richards	2
Sandra Bullock	2 ½	Ashley Judd	4	Chris Rock	3
Steve Buscemi	4	Nastassia Kinski	4 ½	Keri Russell	3 ½
Nicholas Cage	3 ½	Eriq La Salle	3 ½	Kurt Russell	4
Hayden Christensen	3	Jude Law	4 ½	Elisabeth Shue	4
Jennifer Connelly	4 ½	Heath Ledger	3 ½	Gary Sinise	4 ½
Russell Crowe	5	Donal Logue	4	Tom Skelton	4 ½
Emily Cryton	5	Jennifer Lopez	3	Kevin Spacey	5
Matt Damon	4 ½	John Malkovich	4 ½	DeWayne Stevens	4
Keith David	4	Julianna	4	Sharon Stone	3
Daniel Day-Lewis	4 ½	James Marsden	3 ½	Madeline Stowe	4 ½
Vin Diesel	3 ½	Dylan McDermott	3	Kiefer Sutherland	3
Richard Dreyfuss	4	Rose McGowan	3 ½	Mena Suvari	3 ½
Eliza Dushku	4	Tobey McQuire	4 ½	Uma Thurman	4
Charles Dutton	3 ½	Teri Miller	4 ½	Amber Valletta	4 ½
Dakota Fanning	4 ½	Bill Murray	5	Mark Wahlberg	4
Will Ferrell	4	Liam Neeson	4 ½	Denzel Washington	5
Linda Fiorentino	4	Ronda Nelson	4	Damon Wayans	3
James Franco	3 ½	Edward Norton	5	Sigourney Weaver	5
Morgan Freeman	5	Chris O'Donnell	2 ½	Elijah Wood	4 ½
John Goodman	4	Haley Joel	4	Michelle Yeoh	3 ½
Gene Hackman	5	Jason Owens	5	Catherine Zeta-	3 ½
Tom Hanks	5	Anna Paquin	4 ½		
Ed Harris	4 ½	Natalie Portman	4 ½		

MEMO

To: Vice-President, Marketing

From: Marketing Staff

RE: Impact of Marketing Strategy, MPAA Rating, and Expected Ticket Prices

Table B.7 Marketing Strategy Information.

Strategy	Cost (in millions)	Impact on Viewer Appeal
Word-of-Mouth	\$0	+0%
Print + Outdoor	\$5	+30%
Pre-Release TV	\$10	+55%
Saturation TV	\$20	+75%

As shown in Table 1, there are four feasible marketing strategies we can employ, each with a given cost and impact. Note that, as our marketing strategy gets more sophisticated, the costs and the positive change in viewers go up. Basically, the more expensive the strategy, the more effective it is. It is important to note, however, that marketing is most effective when there is a movie with high Viewer Appeal – marketing doesn't help much if the content of the film isn't all that intriguing or if there are no big-name stars. If we're going to produce any "small" high-quality films, it's probably better to just rely on word-of-mouth to spread the news. Overall, a good strategy is to spend money marketing a movie in proportion to its cost – cheap ones we can get away with little or no marketing; expensive ones can benefit from saturation TV marketing.

Table B.8 Impact of MPAA Movie Rating on Size of Potential Viewer Base.

MPAA Rating	Projected Impact
G	0%
PG	-10%
PG-13	-15%
R	-25%
NC-17	-40%

As you can see, "R" or "NC-17" movies take a big hit in that a good proportion of people who go to see movies are excluded from the start. Even if those movies are good, we won't get as many people coming to see them simply because the potential viewer base is smaller! Obviously, "G" films give us the largest possible base, so we should keep an eye out for any of those.

Table B.9 Year 1 Average Ticket Price in Dollars for Potential Movies.

Movie Title	Average Expected Ticket Price
A Lifetime of Anger	\$ 7.50
Rio	\$ 7.50
Southern Accents	\$ 7.50
Chosin Reservoir	\$ 7.25
Degeneration	\$ 7.00
Light Years	\$ 7.00
On Campus	\$ 7.00
Renegade	\$ 6.75
Fast Food	\$ 6.50
Sex Ed	\$ 6.50
Rikki-Tikki-Tavi	\$ 6.00

Table B.10 Year 2 Average Ticket Price in Dollars for Potential Movies.

Movie Title	Average Ticket Price
A Good Day to Die	\$ 7.50
Hoover	\$ 7.50
The Devil Made Me Do It	\$ 7.50
The Wolf's Lair	\$ 7.50
Air Cav	\$ 7.00
We, The People	\$ 7.00
Line of Duty	\$ 6.75
The Reactor	\$ 6.75
Welcome to My Room	\$ 6.50
Extrapolation	\$ 6.25
Oil & Water	\$ 6.25

We had the bean-counters in Finance use their fancy regression models to predict the average ticket price for each potential movie based on projected demographics. These financial models take into account a host of factors and they're usually pretty accurate. As you can see from Table 3, the potential movies for next year are predicted to have average ticket prices ranging from \$6.00 to \$7.50.

Screenplay Profile (SAMPLE)

Title: *Rikki-Tikki-Tavi*

Genre: 3-D Animation

Audience: Kids; families

Plot Summary:

Based on the best-selling children's stories by Rudyard Kipling. Set in India and using state-of-the-art 3-D technology, the movie follows the exploits of the beloved mongoose, Rikki-Tikki-Tavi, and his friends, Darzee and Chuchundra. At the beginning of the film, Rikki-Tikki-Tavi's curiosity nearly results in his drowning. Crawling out of a pond, he is found near death on a garden path by Anna, a little girl who belongs to an English couple who work at the British Foreign Ministry in the nearby city. Anna falls in love with Rikki and nurses him back to health. Rikki soon makes friends with Darzee, a bird that lives in the garden, and Chuchundra, a muskrat. These two tell Rikki of a great menace that has recently arrived – Nag and Nagaina, two huge cobras that have moved into the garden and view humans as mortal enemies. After Nagaina kills Anna's mother as she sits rocking their newborn baby, Rikki vows to defend the family. Several tense battles ensue, one that sees Rikki nearly killed from a bite by Nag, and another in which Nagaina is killed by Rikki as she moves to strike Anna in her sleep. The climactic scene involves a confrontation between Rikki and Nag, where it takes the combined efforts of Rikki, Chuchundra and Anna to trap and eliminate the mighty predator.

<i>Talent</i>	<i>Role</i>	<i>Type</i>
Cuba Gooding Jr.	Rikki-Tikki-Tavi (Voice)	Support
Hallie Kate Eisenberg	Anna (Voice)	Support
Tim Allen	Chuchundra (Voice)	Support
Roseanne Barr	Nagaina (Voice)	Support
Regis Philbin	Nag (Voice)	Support

Director: Stanley Eider

Cost: \$65 million

Team Number: _____

Date: _____

FINAL RECOMMENDATION SHEET

1. You may only use the amount of money budgeted for this session, **\$150 million**. You cannot spend more than \$150 million; if a plan that involves overspending is mistakenly submitted, your group will not be eligible to receive the performance bonus. It is your responsibility to make sure that your plan is valid.
2. Any unused money will count towards your revenue.
3. All team members must sign the document; if any signatures are missing, the document will be returned.
4. You have 25 minutes to make your choices; if your team has not completed its selection process within the allotted time, only the valid choices you have selected will count and the unused portion of your budget will be counted as revenue.
5. TO CHOOSE A MOVIE FOR PRODUCTION, DO THE FOLLOWING:
 - a. Indicate your choice by checking the appropriate box below
 - b. Choose a dollar amount to spend on marketing (the default is \$0)

Title	Production \$	+	Marketing \$	=	Total \$
<i>(All amounts are in millions of dollars)</i>					
<input type="checkbox"/> A Lifetime of Anger	<u>\$20</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Chosin Reservoir	<u>\$46</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Rikki-Tikki-Tavi	<u>\$65</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Degeneration	<u>\$51</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Fast Food	<u>\$25</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Light Years	<u>\$90</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> On Campus	<u>\$12</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Renegade	<u>\$38</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Rio	<u>\$40</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Sex Ed.	<u>\$29</u>	+	0 5 10 20	=	_____
<input type="checkbox"/> Southern Accents	<u>\$23</u>	+	0 5 10 20	=	_____

Total: _____

Signatures:

Vice-President, Industry Research: _____

Vice-President, Script Evaluation: _____

Vice-President, Talent Appraisal: _____

Vice-President, Marketing: _____

Team Number: _____

Date: _____

REVENUE & PROFIT SHEET

Below is the list of possible movie selections for the first year. The first column shows the cost for each movie as given on the initial sheet; the second column indicates the marketing value of the movies (assumed to be \$10 million for any movie your studio did not produce). The third column highlights profit generated from each movie based on the amount of marketing indicated. Please review and discuss this information with the rest of your team. (All amounts are in millions of dollars.)

<u>Title</u>	<u>Production</u>	<u>Marketing</u>	<u>Revenue</u>	<u>Profit</u>
<input type="checkbox"/> A Lifetime of Anger	\$20	_____	_____	_____
<input type="checkbox"/> Chosin Reservoir	\$46	_____	_____	_____
<input type="checkbox"/> Rikki-Tikki-Tavi	\$65	_____	_____	_____
<input type="checkbox"/> Degeneration	\$51	_____	_____	_____
<input type="checkbox"/> Fast Food	\$25	_____	_____	_____
<input type="checkbox"/> Light Years	\$90	_____	_____	_____
<input type="checkbox"/> On Campus	\$12	_____	_____	_____
<input type="checkbox"/> Renegade	\$38	_____	_____	_____
<input type="checkbox"/> Rio	\$40	_____	_____	_____
<input type="checkbox"/> Sex Ed.	\$29	_____	_____	_____
<input type="checkbox"/> Southern Accents	\$23	_____	_____	_____

**A check mark in a box above indicates movies your studio produced.

+ _____
Unspent

Total Profit for this year: _____

Percentage of Maximum Profit: _____

Team Number: _____

Date: _____

FINAL RECOMMENDATION SHEET

6. You may only use the amount of money budgeted for this session, **\$150 million**. You cannot spend more than \$150 million; if a plan that involves overspending is mistakenly submitted, your group will not be eligible to receive the performance bonus. It is your responsibility to make sure that your plan is valid.
7. Any unused money will count towards your revenue.
8. All team members must sign the document; if any signatures are missing, the document will be returned.
9. You have 25 minutes to make your choices; if your team has not completed its selection process within the allotted time, only the valid choices you have selected will count and the unused portion of your budget will be counted as revenue.
10. TO CHOOSE A MOVIE FOR PRODUCTION, DO THE FOLLOWING:
 - a. Indicate your choice by checking the appropriate box below
 - b. Choose a dollar amount to spend on marketing (the default is \$0)

Title	Production \$	+	Marketing \$	=	Total \$
<i>(All amounts are in millions of dollars)</i>					
<input type="checkbox"/> A Good Day to Die	\$20	+	0 5 10 20	=	_____
<input type="checkbox"/> Air Cav	\$46	+	0 5 10 20	=	_____
<input type="checkbox"/> Extrapolation	\$65	+	0 5 10 20	=	_____
<input type="checkbox"/> Hoover	\$51	+	0 5 10 20	=	_____
<input type="checkbox"/> Line of Duty	\$25	+	0 5 10 20	=	_____
<input type="checkbox"/> Oil & Water	\$90	+	0 5 10 20	=	_____
<input type="checkbox"/> The Devil Made Me Do It	\$12	+	0 5 10 20	=	_____
<input type="checkbox"/> The Reactor	\$38	+	0 5 10 20	=	_____
<input type="checkbox"/> The Wolf's Lair	\$40	+	0 5 10 20	=	_____
<input type="checkbox"/> Welcome to My Room	\$29	+	0 5 10 20	=	_____
<input type="checkbox"/> We, The People	\$23	+	0 5 10 20	=	_____

Total: _____

Signatures:

Vice-President, Industry Research: _____

Vice-President, Script Evaluation: _____

Vice-President, Talent Appraisal: _____

Vice-President, Marketing: _____

Team Number: _____

Date: _____

REVENUE & PROFIT SHEET

Below is the list of possible movie selections for the first year. The first column shows the cost for each movie as given on the initial sheet; the second column indicates the marketing value of the movies (assumed to be \$10 million for any movie your studio did not produce). The third column highlights profit generated from each movie based on the amount of marketing indicated. Please review and discuss this information with the rest of your team. (All amounts are in millions of dollars.)

<u>Title</u>	<u>Production</u>	<u>Marketing</u>	<u>Revenue</u>	<u>Profit</u>
<input type="checkbox"/> A Good Day to Die	<u>\$20</u>	_____	_____	_____
<input type="checkbox"/> Air Cav	<u>\$46</u>	_____	_____	_____
<input type="checkbox"/> Extrapolation	<u>\$65</u>	_____	_____	_____
<input type="checkbox"/> Hoover	<u>\$51</u>	_____	_____	_____
<input type="checkbox"/> Line of Duty	<u>\$25</u>	_____	_____	_____
<input type="checkbox"/> Oil & Water	<u>\$90</u>	_____	_____	_____
<input type="checkbox"/> The Devil Made Me Do It	<u>\$12</u>	_____	_____	_____
<input type="checkbox"/> The Reactor	<u>\$38</u>	_____	_____	_____
<input type="checkbox"/> The Wolf's Lair	<u>\$40</u>	_____	_____	_____
<input type="checkbox"/> Welcome to My Room	<u>\$29</u>	_____	_____	_____
<input type="checkbox"/> We, The People	<u>\$23</u>	_____	_____	_____

**A check mark in a box above indicates movies your studio produced.

+ _____
Unspent

Total Profit for this year: _____

Percentage of Maximum Profit: _____

Instructions to the Team for Tinsel Town

After participants are assigned to roles and given the training interventions, they will be given the following instructions:

“Tinsel Town is a top management simulation in which you will play the role of a Vice President in a fictional Hollywood movie studio. The four Vice President positions consist of: VP Marketing, VP Industry Research, VP Talent Appraisal, and VP Script Evaluation. Your team’s task is to decide which movies to produce across two simulated business years. Your overall goal is to achieve the highest possible profit across these two years.

Each of you has received a folder containing a general memo from the CEO that provides information about how to determine the movies with the best profit potential and summaries of screenplays that you can choose to purchase and turn into a movie. In addition, you each have received some information specific to your individual role. Your team should use this information to make decisions about what movies to produce and how much to spend marketing each one.

Each simulated year will begin with a period of 15 minutes where each team member will have the opportunity to silently and individually review the information at their disposal. No discussion or interaction is permitted during this time. You may take notes on the scratch paper provided, but do not share this information with others at this time.

After the 15-minute individual review period, you begin the discussion period. You will then have 25 minutes to discuss the task and reach agreement concerning which movies to produce and how much money to spend on marketing them. You must all be in agreement regarding your choices, and each person will indicate their agreement by signing the form where your collective recommendations are made (*hold up the form*).

Record the agreed-on recommendations on the provided form marked Final Recommendations by placing a check in the box next to a movie and circling a marketing amount (0, 5, 10, or 20 million dollars) to the right. The total cost of a movie is its production cost plus its marketing cost; sum these two values for each movie and indicate the total in corresponding space. **You may choose as many movies as you would like, subject to the constraint that you cannot spend more than 150 million dollars in any decision period.** Therefore, the total at the bottom right of the Final Recommendations Sheet must be less than or equal to 150 million dollars.

At the end of each simulated year, I will collect your Final Recommendation sheet, calculate the total profit you generated, and provide feedback to your team. This sheet will show you the revenue and profit for the movies you selected as well as the revenue and profit of the movies you did not select. At the bottom of this sheet you will see your total profit and the percentage of the maximum profit that your team achieved. After you have had a brief chance to review this feedback, I will distribute the information for the second decision period, and we will complete the process one more time.

Are there any questions?”

Appendix C: Measures**Background Measures**

Participant #: _____

Team #: _____

Please respond to the following seven questions and answer them honestly. Your responses will be kept confidential and will in no way impact the determination of how well your team performs.

1. What is your gender?

- Female
- Male

2. Which of the following best describes your ethnicity?

- Hispanic or Latino
- White
- Black or African American
- Native Hawaiian or Other Pacific Islander
- Asian
- American Indian or Alaska Native
- Two or More Races

3. In years, what is current age?

_____ years of age

4. How many credit hours have you completed?

_____ credit hours

5. What is your cumulative grade point average (GPA)?

6. If you are currently employed, how many hours do you typically work per week?

_____ hours/week

_____ Check here if you are not currently employed.

7. During your employment history, have you ever been a member of a work group or team?

- Yes
- No
- I have never been employed.

Personality Measure

How Accurately Can You Describe Yourself?

Participant #: _____

Team #: _____

Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Indicate for each statement whether it is Very Inaccurate, Moderately Inaccurate, Neither Accurate Nor Inaccurate, Moderately Accurate, or Very Accurate as a description of you.

	Very Inaccurate	Moderately Inaccurate	Neither Accurate Nor Inaccurate	Moderately Accurate	Very Accurate
Am relaxed most of the time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Don't talk a lot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have a rich vocabulary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am not really interested in others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am always prepared.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get stressed out easily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am the life of the party.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have difficulty understanding abstract ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am interested in people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leave my belongings around.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Seldom feel blue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep in the background.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have a vivid imagination.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insult people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
			Neither Accurate		
	Very Inaccurate	Moderately Inaccurate	Nor Inaccurate	Moderately Accurate	Very Accurate
Pay attention to details.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Worry about things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feel comfortable around people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am not interested in abstract ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sympathize with others' feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make a mess of things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am easily disturbed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have little to say.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have excellent ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am not interested in other people's problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get chores done right away.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get upset easily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Start conversations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do not have a good imagination.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Have a soft heart.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Often forget to put things back in their proper place.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Change my mood a lot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Don't like to draw attention to myself.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am quick to understand things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feel little concern for others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
			Neither Accurate		
	Very Inaccurate	Moderately Inaccurate	Nor Inaccurate	Moderately Accurate	Very Accurate
Like order.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have frequent mood swings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Talk to a lot of different people at parties.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use difficult words.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Take time out for others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shirk my duties.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get irritated easily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am quiet around strangers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spend time reflecting on things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feel others' emotions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Follow a schedule.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Often feel blue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Don't mind being the center of attention.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am full of ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make people feel at ease.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Am exacting in my work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Adapted from Goldberg (1999b)

Team Role Performance Measure

Self-Report Ratings

Participant #: _____

Team #: _____

Instructions: Please read through each role description and related actions. Then indicate the extent to which **you** performed the actions when needed for team effectiveness. Please respond using the 5-point scale next to each action.

Contractor Role

Role Description: Organized the work and kept others focused on getting it done efficiently.

To what extent did *you* perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Organized the team's work to get important work done on time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coordinated the work done by others so that things were done in the right order.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped the team focus on getting the job done efficiently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Creator Role

Role Description: Had new and creative ideas for solving problems and getting the work done.

To what extent did *you* perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Suggested creative ways to solve the team's problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped the team take a fresh perspective on problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saw the "big picture" and had creative ideas for handling problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Contributor Role

Role Description: Had new and creative ideas for solving problems and getting the work done.

To what extent did *you* perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Spoke out when he/she knew the most about the work to be done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shared with the team any knowledge he/she had about the work to be done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Took the lead in the team when he/she had a lot of experience in that area of work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Completer Role

Role Description: Took personal responsibility for the team's work, volunteered for new jobs, and followed through on the commitments made.

To what extent did *you* perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Took personal responsibility for getting the work done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finished work for the team on time without being reminded.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Followed through on commitments made to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Critic Role

Role Description: Thoroughly thought through what the team was doing to make sure it was not rushed and considered both positive and negative aspects.

To what extent did *you* perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Spoke up if he/she had concerns with the work the team was doing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Made sure the team talked about both positive and negative consequences of decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shared honest opinions about how the team was working, even if the opinion was not favorable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Communicator Role

Role Description: Communicated clearly, honestly, and respectfully with others, making the work atmosphere more comfortable because he/she was pleasant to work with.

To what extent did *you* perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Made the work pleasant and comfortable by being happy and easy to work with.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communicated personal feelings and thoughts respectfully and without offending anyone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Listened carefully to the thoughts and feelings of others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Calibrator Role

Role Description: Encouraged the team to get along together by helping to settle conflicts, deal with problems, and be respectful

To what extent did *you* perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Helped settle conflicts between members of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suggested positive ways for the team to interact such as taking turns, showing respect, and being open to new ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stepped in if there were negative feelings in the team to help resolve the difficulties.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Measure adapted from Mumford, Campion, & Morgeson (2006)

Team Role Performance Measure

Team member ratings

Participant #: _____

Team Member #: _____

Team #: _____

Instructions: Please read through each role description and related actions. Then indicate the extent to which each of your team members performed the actions when needed for team effectiveness. Please respond using the 5-point scale next to each action.

Contractor Role

Role Description: Organized the work and kept others focused on getting it done efficiently.

To what extent did this team member perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Organized the team's work to get important work done on time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coordinated the work done by others so that things were done in the right order.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped the team focus on getting the job done efficiently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Creator Role

Role Description: Had new and creative ideas for solving problems and getting the work done.

To what extent did this team member perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Suggested creative ways to solve the team's problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helped the team take a fresh perspective on problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saw the "big picture" and had creative ideas for handling problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Contributor Role

Role Description: Had new and creative ideas for solving problems and getting the work done.

To what extent did this team member perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Spoke out when he/she knew the most about the work to be done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shared with the team any knowledge he/she had about the work to be done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Took the lead in the team when he/she had a lot of experience in that area of work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Completer Role

Role Description: Took personal responsibility for the team's work, volunteered for new jobs, and followed through on the commitments made.

To what extent did this team member perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Took personal responsibility for getting the work done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finished work for the team on time without being reminded.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Followed through on commitments made to the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Critic Role

Role Description: Thoroughly thought through what the team was doing to make sure it was not rushed and considered both positive and negative aspects.

To what extent did this team member perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Spoke up if he/she had concerns with the work the team was doing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Made sure the team talked about both positive and negative consequences of decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shared honest opinions about how the team was working, even if the opinion was not favorable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Communicator Role

Role Description: Communicated clearly, honestly, and respectfully with others, making the work atmosphere more comfortable because he/she was pleasant to work with.

To what extent did this team member perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Made the work pleasant and comfortable by being happy and easy to work with.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communicated personal feelings and thoughts respectfully and without offending anyone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Listened carefully to the thoughts and feelings of others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Calibrator Role

Role Description: Encouraged the team to get along together by helping to settle conflicts, deal with problems, and be respectful

To what extent did this team member perform the following actions when needed for team effectiveness?

	To no extent	To a small extent	To a moderate extent	To a great extent	To a very great extent
Helped settle conflicts between members of the team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suggested positive ways for the team to interact such as taking turns, showing respect, and being open to new ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stepped in if there were negative feelings in the team to help resolve the difficulties.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Measure adapted from Mumford, Campion, & Morgeson (2006)

Appendix D: Vector Tool

Informal Role Configuration Vector

Team #: _____

Instructions: Using the overall informal role performance scores for each participant, add up the total number of informal roles performed across the four team members. For each informal role listed, input the total number of team members performing the role in the appropriate column. For example, if the overall informal role performance scores indicated that two team members performed the Contractor role, write the number “2” in the cell below Contractor. If none of the team members performed a particular role, write “0” below that role. Complete the table below for all seven roles. This seven-digit numerical sequence will serve as the vector informal role configuration for the team.

	Contractor	Creator	Contributor	Completer	Critic	Communicator	Calibrator
# of team members performing the role							

Appendix E: Final Debriefing Form

THANK YOU FOR YOUR PARTICIPATION!

This document provides further insight into the study in which you just participated. Please refrain from sharing these details with other students who may take part in this study in the future. Thank you!

Study Purpose

As teams become more common in the workplace, there is growing push to understand what makes teams effective or ineffective. In the present study, we are exploring the impact of *informal roles* on team effectiveness, where informal roles represent the patterns of related behaviors that individuals adopt within a team. In general, we predict that certain combinations of informal roles will influence a team's decision-making effectiveness. Further, we hypothesize that each person's personality will influence the informal role(s) that he/she adopts. In order to test these relationships, we randomly placed you and your fellow participants into teams, where you completed the Tinsel Town task. The purpose of Tinsel Town is to create an environment in which each team member must effectively share information to make decisions. By working together, you and your teammates may have performed patterns of behaviors consistent with specific informal roles.

Expected Findings

We expect to find that certain personality traits will predict the informal roles team members adopt. Further, we anticipate that the combination of the roles adopted will influence a team's effectiveness.

Implications of Findings

The findings of this study could be used for both selecting applicants and training employees within an organization. For instance, measuring an applicant's personality could potentially be used to predict the informal role(s) he/she will adopt in a workplace team. In this way, organizations could hire applicants who will likely "mesh" well with their future teammates. In addition, the findings of this study could be used to train teams to adopt those informal roles that lead to effective team decision-making.

Relevant References

These articles can be found in the IUPUI University Library, or in full-text on the IUPUI University Library website.

Mumford, T. V., Iddekinge, C. H., Morgeson, F.P., & Campion, M. A. (2008). Team Role Test: Development and validation of a team role knowledge situational judgment test. *Journal of Applied Psychology, 93*, 250-267.

Stewart, G. L., Fulmer, I. S., & Barrick, M. R. (2005). An exploration of member roles as a multilevel linking mechanism for individual traits and team outcomes. *Personnel Psychology, 58*, 343-365.

Questions?

If you have any further questions in the future, please contact one of the researchers: Dennis Devine, (Associate Professor of Psychology at IUPUI), at ddevine@iupui.edu, 317-274-6763, or David Caughlin, (Graduate Student at IUPUI), at dcaughli@iupui.edu.