3-2008

Bibliometrically Mapping Team Cognition Literature: A Co-citation Analysis

Ryan A. Howell

BIBLIOMETRICALLY MAPPING TEAM COGNITION LITERATURE: A CO-CITATION ANALYSIS

THESIS

Ryan A. Howell, Captain, USAF

AFIT/GEM/ENV/08-M10

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

AFIT/GEM/ENV/08-M10

BIBLIOMETRICALLY MAPPING TEAM COGNITION LITERATURE: A CO-CITATION ANALYSIS

THESIS

Presented to the Faculty

Department of Engineering Management

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Engineering Management

Ryan A. Howell, BS

Captain, USAF

March 2008

AFIT/GEM/ENV/08-M10

BIBLIOMETRICALLY MAPPING TEAM COGNITION LITERATURE: A CO-CITATION ANALYSIS

Ryan A. Howell, BS

Captain, USAF

Approved:

_____// signed //_____	9 Jan 08
Christopher J. West, Lt Col, USAF (Chairman)	Date
_____// signed //_____	26 Feb 08
Jason M. Turner, Major, USAF (Member)	Date
_____// signed //_____	26 Feb 08
Alexander J. Barelka, Major, USAF (Member)	Date

Abstract

Researchers investigating team cognition must source and review a challenging set of relevant, mature literature from a diverse array of academic disciplines. Such disciplines may include psychology, management, information science, military science, anthropology, and nursing science to name a few. This thesis summarized an effort to bibliometrically map team cognition literature using a co-citation analysis methodology. The work involved a traditional literature review identifying key authors publishing in peer reviewed journals. These authors were solicited to provide their own listings of key researchers which in-turn were used in conjunction with the Social Sciences Citation Index (*SSCI*) to construct a co-citation matrix of authors. Using factor analysis and multi-dimensional analysis techniques, visual maps were constructed that will highlight the seminality and influence of specific authors, relationships between authors, as well as branching and relationships of sub-domains in the literature over time. The goals of the research were 1) to provide team cognition researchers with a tool they can use to better inform their efforts and 2) to provide an explicit mapping of where the field has been and what new directions may be emerging.

To our heavenly Father, who is always good and from whom there is so much to be thankful for.

Acknowledgments

I am very thankful and appreciative for all those who provided assistance throughout this research process. Most notably, I thank my research committee: Lt. Col. Christopher West, Major Alexander Barelka, and Major Jason Turner. In the midst of preparing for a deployment, Lt. Col. West provided the kind of feedback, guidance, and encouragement that I will be always be thankful for. Major Turner and Major Barelka diligently reviewed my thesis to significantly improve the quality of the product. I would like to offer my thanks to Capt. Brian Low for his helpful advice on the details of the research methodology. I would like to thank my parents for their continual support and their weekly reminder that in order to graduate I need to complete my thesis. I am also thankful for Capt. Elizabeth Yesue's guidance and advice throughout the thesis process. I would also like to thank Capt. Nathan Olsen for sharing his *SPSS* expertise. And to all the family, friends, and faculty that provided assistance, I thank you.

Capt. Ryan A. Howell

Table of Contents

Page

List of Figures

List of Tables

Page

List of Appendices

I. Introduction

The intention of this research endeavor was to thoroughly investigate and map the academic literature within a general area of research of inquiry known as team cognition. In order to most efficiently and effectively present the information in this chapter, it was laid out in a specified format. This introduction provides a general background on the subject matter and motivation for the research. The next section explains the reason why the research was conducted and addresses how the research intended to fill the identified literature gap. Some basic research questions were raised and discussed in order to frame the research. Certain challenges were encountered throughout the research process and as a result, it was helpful to anticipate these potential obstacles as much as possible. The chapter closes by providing insight into some of the possible contributions that may be produced from the outcomes of this research.

In recent years, organizations are becoming increasingly reliant on teams of people to accomplish their mission objectives (Salas & Fiore, 2004). Because teams are essentially the backbone of most successful organizations, it is a worthwhile endeavor to analyze these teams closely. More specifically, an aspect of team cohesion that is the focus of considerable recent research is the relationships between the team members and how they influence organizational performance (Salas & Fiore, 2004). To address these concerns, team cognition research has emerged as a subject matter of inquiry.

Team cognition has grown out of cognitive science focusing on information and knowledge gathered over time through the influences and interactions among personnel and the surrounding environment (West, 2004). This concept is helpful in understanding how humans interact and learn in an organizational environment. Team cognition as an

area of research has emerged within the last 20 years primarily within psychological research but has progressed somewhat into other fields such as organizational studies. Team cognition has the potential of yielding extremely useful information not only to areas within cognitive science, but to other academic areas and organizations as well. For example, the findings obtained as a result of this research may enhance the understanding within a discipline such as the engineering management community. The learning gained from research into team cognition could result in more efficient organizational practices sometime in the not too distant future.

Due to the fact that the Air Force as an organization is always adapting and rapidly changing to meet operational demands and is dependent upon integrating a variety of separate, specialized and growing bodies of knowledge, this research may serve to indirectly increase the applicable understanding of the complexity of the Air Force organization as well as the environment in which it must operate. A thorough analysis and mapping of the literature within the discipline should result in a product that will provide an accurate picture of the team cognition body of knowledge over a certain length of time. The intention of this research was to develop such a product that will provide a useful representation of team cognition and fill a gap within the academic literature that will serve as a foundation for further research into the area of inquiry and other potentially applicable areas.

Background Information on Team Cognition

Fully understanding the purpose of these efforts requires an introductory framing of team cognition as a research topic. As opposed to many constructs within management science, the concept of team cognition has not been rigorously defined or

converged upon, thus the discussion that follows captures the thoughts of several authors presenting knowledge similar to a definition of the concept. According to Merriam Webster's Online Dictionary (2007), cognition is generally defined to mean "to become acquainted with" or "to come to know." Similarly, Hutchins (2000) states that attributes of cognition are directly related to characteristics such as learning, decision making, and memory. These aspects of cognition are useful in attempting to apply and understand the concepts of distributed cognition in an organizational context (Hutchins, 2000).

Hutchins (2000, p. 1), a much cited author in the cognitive science discipline identifies three essential principles of a form of team cognition known as distributed cognition: (1) developments in cognition occur throughout the members of a group, (2) developments in cognition requires an interaction between "internal and external (material or environmental)" arrangements, and (3) developments in cognition are affected over the course of time, in other words the occurrence of events in the past will alter the composition of events in the future. Other early investigators include Schwartz (1978), who asserted that the beliefs within a culture are distributed among the people of a population and Vygotsky (1978), who claimed that individual learning resonates and is reflected throughout a community as a result of the interactions with others (as cited in Hutchins, 2000, p. 2). The works of Vygotsky (1978) and Minsky (1985) concerning distributed cognition are often cited as foundational to the emergence of the research topic (as cited in Hutchins, 2000, p. 2).

As a result of early research within the subject matter involving detailed analyses of "mental representations over time by groups of individuals," distributed cognition can be defined as the "processes by which collectives learn about and act within their

environment" (West, 2004, p. 10). A focus of distributed cognition research is the examination of how individuals are affected by the "social and the material cognitive processes" that occur within the surrounding environment (Hutchins, 2000, p. 9). These general concepts, all relating to an understanding of team cognition but without rigorous specificity, are themselves indicative of the need to rigorously map this emerging subject.

Research Methodology

The purpose of bibliometrics is to illustrate "the nature and course of development" of a specific research area through a quantitative analysis of books, journal articles, as well as other written documents (Borgman, 1989, p. 585). The technique chosen for this endeavor is called a co-citation analysis and has been defined by Osareh (1996) to mean "the number of times that two earlier documents are cited together by a new article." In other words, it is a "form of document coupling," which assesses the amount of times a scholarly publication cites any two publications (Culnan, 1986, p. 158). Osareh's definition of a co-citation analysis will be modified throughout this research effort and will appropriately be known as an author co-citation analysis. As the number of citations increase among a pair of authors, the strength of the relationship also increases (Culnan, 1986). This method demonstrates the resounding effects and influence an author has within the research area of focus (Okubo, 1997). According to Culnan (1986), the findings from an author co-citation analysis may yield an accurate snapshot in time of the subject matter, how the subject matter has taken shape and what direction it is heading, and provide a good picture of the key authors in the area of inquiry. The intent of the author co-citation analysis is to determine the specific research niches of an author according to his or her interests. It is important to note that the

previous statement is dependent upon a foundational assumption that authors publish in separate research areas with little overlap. This aspect of the analysis will be examined in more detail in later chapters. An author co-citation analysis has not been performed on the team cognition literature and as a result, it will be a useful research endeavor.

An additional aspect that must be considered within the literature being analyzed is the concept of time. Team cognition research has emerged within the last 20 years; however, its focus since its inception may have changed. As a result, the dates of the literature in use must be addressed and assembled chronologically. This will enable the researcher to more specifically determine how the subject matter has progressed over time and identify in what direction it is moving. For this particular segment of the methodology, the research addressed a contemporary evolution of the subject matter. In other words, the only research that will be used to investigate the progression of team cognition is the research published after the term "team cognition" emerged. Observing the area of inquiry as it has progressed and changed throughout its lifespan will add another advantageous dimension to effectively analyzing team cognition.

Reason for the Research, Filling the Literature Gap

As stated earlier, team cognition seems to be a relatively young discipline, but may have great potential in increasing the performance of an organization. In the early 1990s, the subject of team cognition and its effects on team performance began to be heavily scrutinized (Salas & Fiore, 2004). Since that time, a large amount of energy within a multitude of disciplines has been devoted to research in this area. Salas and Fiore (2004) propose that a deeper understanding of the factors influencing team performance must be accomplished. Once this occurs, they assert, "theoretically driven

and empirically based guidelines for designing, managing, and developing teams" can be produced (Salas & Fiore, 2004, p. 4). In fact, Salas and Fiore (2004, p. 5) even say that their book, *Team Cognition,* "was conceived to address such a perceived need in the team cognition literature." As discussed earlier, the intention of the author co-citation analysis methodology was to produce a vivid image of the area of research inquiry. These results may encourage even more interest and more research on how team cognition can affect an organization. Since a need to develop a further understanding of team cognition has obviously been addressed, some specific questions were established.

Research Questions

Before proceeding any further, it is essential to identify some basic research questions to act as a guide throughout the process. An important concept to keep in mind is the purpose of the research, which is to help researchers from any discipline interested in the subject matter of team cognition gain an understanding of the nature of the published academic literature. As a result, the following questions were generated and will be investigated throughout the research: (1) what authors have significantly impacted team cognition research, (2) what are the emergent themes within team cognition literature that can be identified, and (3) how has team cognition research evolved throughout its lifetime?

Possible Contributions to the Practitioner

This research is primarily targeted at aiding the researcher investigating team cognition phenomena, thus benefits would be seen indirectly. A rigorous evaluation of team cognition literature will yield indirect benefits to the United States Air Force (USAF) and other organizations and institutions who depend on teams to work together

to understand complex external environments. The Air Force is an organization comprised of numerous teams and relies heavily on the effectiveness of these teams to complete the mission. As a result, a more complete understanding of team cognition could eventually lead to the implementation of practical knowledge or theories within large organizations such as the Air Force. This knowledge may serve to increase the efficiency and performance within the teams that help accomplish the mission. This research may also act to extend prior studies on improving the performance within military control centers (West, 2004). Consequently, the present analysis on team cognition may uncover previously unknown information such as practical theories, strategies, or methodologies that may enhance the original research.

Organization of Research

Figure 1, Research Flow Chart, provides an overall plan illustrating the organization of the research. This effectively represents the stages taken throughout the research process. The first steps taken in this flow chart were the completion of specific initial tasks such as describing the reason for the research and indicating the primary research questions. These components comprise a significant part of the first chapter. Although these components were completed first, they represent the foundation for the following chapters. Another topic included in the first chapter is a brief summary of the methodology selection. This section will be elaborated upon in much greater detail in the third chapter.

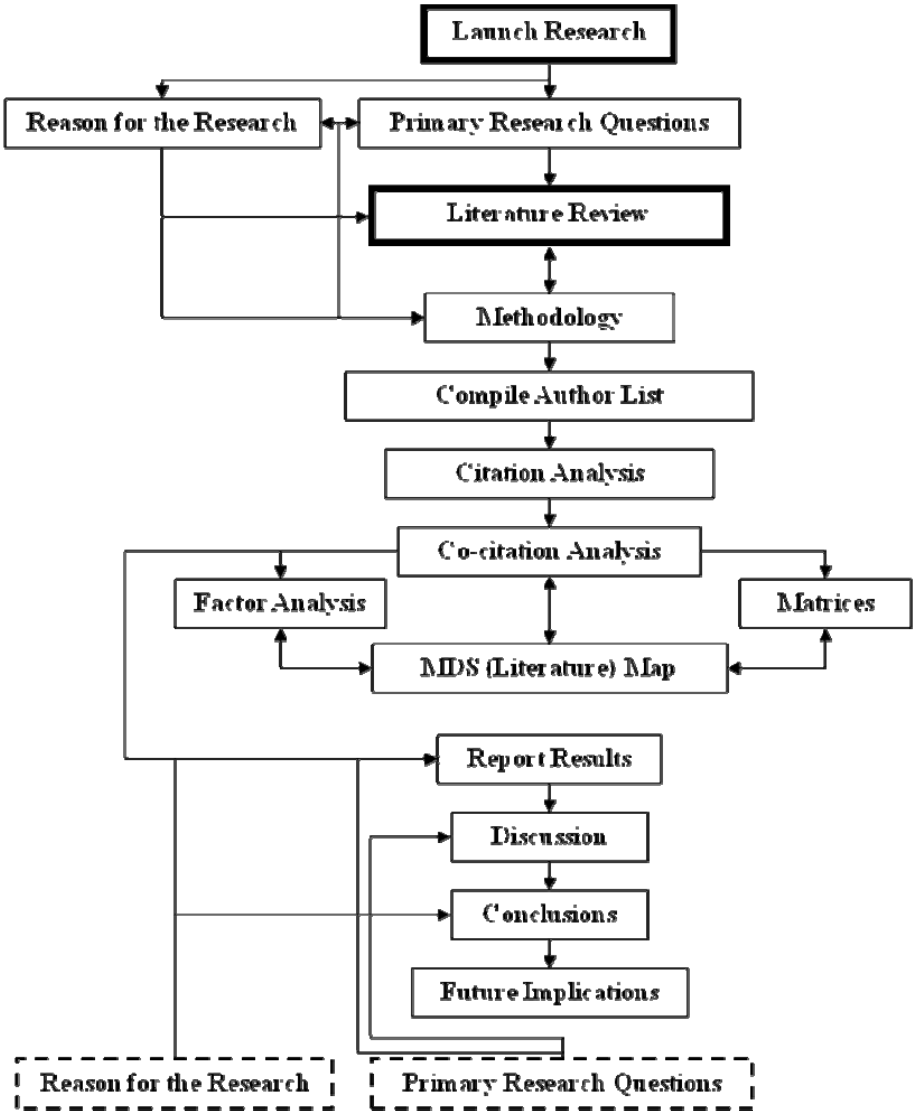

Figure 1. Research Flow Chart

The purpose of the second chapter is to provide a sufficient literature review on team cognition. A literature review on the topic was completed to enlighten the reader with a sufficient understanding and background of the material. In order to accomplish this, the chapter includes sections that discuss common terms, common themes, and practical examples found throughout the literature. The reason an entire chapter is dedicated to providing the reader with an understanding of team cognition is to support

the factor analysis section described in chapter three. This will be discussed in greater detail in the next chapter. Once a sufficient knowledge of team cognition is acquired, then it is appropriate to supply a full description of the methodology. This methodology will constitute the body of chapter three. Chapter four will report the results produced when the process described in chapter three is performed. Upon completion of the first four chapters, the last chapter will discuss the implications of the results, conclusions that need to be addressed, and future implications for the subject matter of team cognition. Each of these chapters will coincide to form an integrally connected document that will sufficiently answer the questions proposed in this first chapter.

Conclusion

Although team cognition is continuing to expand and grow, it is still a rather youthful topic in terms of its understanding. Despite this, an author citation co-citation analysis will be employed to potentially unlock useful concepts of knowledge. This knowledge may serve to uncover practical wisdom that can be applied to other fields of study. Completing this research endeavor will hopefully further a growing understanding of the subject matter of team cognition. In order to effectively lead the reader through the research process, it is necessary to provide a logical synopsis of team cognition. As a result, the next chapter will be in the form of a literature review where a sufficient sample of publications will be used to suitably summarize the topic.

II. Literature Review

Introduction

The intent of this chapter is to review literature about team cognition in order to help address the previously identified research questions: 1) what authors have significantly impacted team cognition research, 2) what are the emergent themes within team cognition literature that can be identified, and 3) how has team cognition research evolved throughout its lifetime? As a result, this chapter provides a literary foundation to support the taxonomic classification effort of team cognition subject matter in the latter portion of the co-citation analysis and will serve as a spring board into the subsequent sections of this research effort. Besides answering the research questions, the reason this chapter will be a "spring board" into the last three chapters of the effort was three fold. First, the development of this chapter has enlightened the researcher with the understanding needed to complete the methodology, namely the factor analysis. Second, this chapter attempts to provide the reader with a frame of reference and adequately prepare him or her for the upcoming chapters. In other words, a background on the topic has been provided to avoid losing the reader. Third, the researcher was able to compare and contrast the results of the themes identified in this chapter to the factors identified in chapter four.

The first research question focuses on the multidisciplinary nature of team cognition research with the first objective being to gain an understanding of the conceptual development of the subject. With this in mind, a good place to start is to gain an understanding of team cognition. In order to provide an adequate background of the subject, some of the important events will be discussed about the development of this

topic. Next, several common, but essential terms will be defined that are prevalent throughout the literature. In addition, the foundational themes at the heart of team cognition literature will be identified and a few important studies will also be described to show how team cognition can be usefully applied. Finally, various criticisms of the research topic will be highlighted before concluding with a summary of the chapter.

A separate literature review supporting the selection and development of research methodology, co-citation analysis, will be presented in chapter three. After this subject is addressed, the specific research questions stated in the first chapter will then be answered more directly in chapters four and five through the application of the concepts discussed in this literature review.

Evolution of Team Cognition

Because team cognition is a fairly new subject matter, it is logical to explain how this research topic has emerged into its current state. As its name implies, team cognition has its roots in cognitive science; however, before team cognition is explained, it would be more appropriate and beneficial to explain the development of distributed cognition in general before explicitly moving to teams.

Moving Beyond Individual Cognition

The traditional study of cognition did not start at the group, organization, or even team level, but rather as Ocasio (2001) states, cognition was first developed at the individual level. As time progressed, scholars began to develop an understanding that groups also exhibit cognitive attributes collectively. In the 1920's, Halbwach (1925) suggested that an individual's memory was not a product of the isolated individual (as cited in Hutchins, 2000, p. 2). After Roberts (1964) observed and analyzed the cognitive

properties of a society, he suggested that "social organization" could be interpreted at the "community level (as cited in Hutchins, 2000, p. 2)." Fourteen years later, an English translation of Russian author Vygotsky's *Mind in Society* was released. A significant portion of this work asserted that a person is able to reproduce or build upon the cognitive schemas acquired as a result of relations with others. When "individual learning" occurs, cognitive patterns seem to materialize throughout the community (Hutchins, 2000, p. 5).

Several authors have also noted the importance of the "material environment" within the concept of distributed cognition (Hutchins, 2000, p. 7). This is an important point to note for two reasons. First, the "cognitive revolution" that occurred in the 1950's caused anthropologists to focus on the "knowledge" acquired by a single person that could only be expressed or declared and as a result, "skills" were dismissed (Hutchins, 1995, p. xiii). In addition, as researchers focused on an individual's knowledge, they also began to ignore "how people go about knowing what they know and of the contribution of the environments in which the knowing is accomplished" (Hutchins, 1995, p. xii).

In recent years, researchers such as Hutchins have opposed these pursuits centered within a single person and once again began to consider the environment. This environment that is encountered by individuals on a daily basis may serve as a "medium" for "cognitive activity" (Hutchins, 2000, p. 7). In addition, Simon (1981) claimed that over time, humanity's environment for learning continually changes. As a result, a large amount of knowledge has not only been discovered about the intricacies of an individual's thinking, but also about the environment in which the individual thinks. Eventually Salomon (1993) attempted to define distributed cognition by claiming that it refers to the similar "cognitive processes" that are incorporated within the "members of a

social group" (as cited in Hutchins, 2000, p. 2). The significance of distributed cognition is rooted in establishing a relationship between the external, material world and the embedded thought processes located within the human mind.

Team Cognition

Organizations such as the military, businesses, and athletics use teams extensively to accomplish the required tasks. These organizations employ teams with the hope that they will be more effective at working on a project or task than an individual. Despite this hope, teams have not always been as efficient and successful as the leaders of the organization had initially projected. Consequently, researchers have sought to improve team performance and efficiency by better understanding the ins and outs of how a team functions. In most cases, companies form teams because they believe that these teams, not individuals, will be highly beneficial to the company's interests (Fiore & Schooler, 2004). An essential component to the successful operation of a team requires the team to fully define and understand its characteristics, which includes possible situations the team may encounter (Fiore & Schooler, 2004). With this in mind, team cognition emerged as a promising area of study in which to investigate this topic.

Cognitive science plays a significant role in the development of team cognition. In recent years, some significant constructs from cognitive science have been applied to team cognition to help uncover how it "contributes to effective team performance" (Salas & Fiore, 2004). For example, to enhance the development of team cognition, it has used the concepts of distributed cognition and other meaningful constructs derived from the cognitive science field. Teams are perceived to impact an organization's performance in a positive way by handling stress more effectively, improving upon decision making

skills, adapting to meet required needs, and accomplishing more than most individuals (Cooke, Salas, Kiekel, & Bell, 2004). In order to substantiate these notions, the "shared information processing" that occurs among the members of the team must be analyzed (Salas & Fiore, 2004). Consequently, team cognition has several common characteristics with, and actually stems from, cognitive science. Edwin Hutchins (2000, p. 1), known for his works on distributed cognition, asserts that these shared concepts include the "memory, decision making, inference, reasoning, and learning" that are included within "cognitive processes."

Clarification of Key Team Cognition Terms

Because team cognition is a developing area of research an operational glossary of terms needs to be presented. This section of the literature review will identify key terms that various authors have deemed important throughout their research. Although some of the terms may have been somewhat defined, it is necessary to explicitly define them in order to operationalize them for purposes of this research. In some instances, multiple definitions will be provided for some of the terms to increase the depth and breadth of understanding.

Distributed/Team/Organizational Cognition

To begin, it seems appropriate to address the various definitions of cognition that appear in the literature. Although inherently similar, the concepts of distributed, team, and organizational cognition possess subtle, but important differences. From the literature, distributed cognition appeared to precede team and organizational cognition and will be presented first. Distributed cognition helps to establish a "balance between individual and collective" cognitive processes, while at the same time, clarifying the "role

of artefacts" (Artman & Waern, 1999, p. 238). "The importance of distributed cognitive systems is simply that they make possible the acquisition of knowledge that no single person, or a group of people without instruments, could possibly acquire" (Gievre & Moffatt, 2003, p. 305).

An effective description of team cognition must be rendered and will serve as a foundation for future use. Cooke, Salas, Kiekel, and Bell (2004) contest that team cognition is more than a mere sum of the cognition that exists among the individual team members, rather it is a phenomenon emerging from the interaction and relationship between each team member. Because some researchers argue that the cognition of an individual influences the cognition of an organization, the term organizational cognition was also developed (Ocasio, 2001). In other words, theorists are sometimes interested in how the "symbolic representations, knowledge structures, or schemas" of individuals influence the organization (Ocasio, 2001, p. 39).

Ocasio (2001) identifies three ways of approaching organizational cognition. The first is quite obvious and asserts that organizational situations are where organizational thought processes occur. Next, the organizational cognition that transpires is structured in some fashion and the "physical, cultural, economic, and social characteristics of the organizational environment structure" are identified (Ocasio, 2001, p. 42). Lastly, organizationally, collective cognition continues although personnel may change. These concepts are an important foundation of this research.

Mental Models

Because mental models are discussed in team cognition literature, it will be helpful to define the different uses of the term. A "mental model" is a term that describes

how people use an inherent “organized knowledge structure” that enables them to relate to their surrounding environment (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000, p. 274). For instance, a person’s mental model will help the individual determine what is right and wrong in a given situation, how a soccer ball is used correctly in the field of play, and even how to predict the weather. In other words, mental models permit individuals to “describe, explain, and predict events in their environment” (Mathieu et al., 2000, p. 274). A “shared mental model” in a team makes it possible for its members to cooperatively apply their own reservoir of knowledge to the actions and decisions consistent with the rest of the team (Mathieu et al., 2000, p. 274). Before the performance of teams can increase, an adequate level of understanding will help guide researchers and practitioners towards the development practical tools to accomplish this goal. With this in mind, the concept of a shared mental model was developed in the early 1990's to account for why a team functions the way it does. As a result, the team mental model theorizes how groups adapt to “difficult and changing task conditions” (Mathieu et al., 2000, p. 274).

Common Themes Found Within Team Cognition Literature

Although the concepts of team cognition have been briefly discussed, it is important to identify some of the common themes that have emerged in the research. More specifically, the themes in this section will include shared cognition, environment and context, awareness, and coordination/communication. It is important to note that the themes discussed in this section are not empirically founded. Instead, the researcher determined that these themes exemplified the most important topics. In chapter five, the

results from this section of the chapter two were compared to the results extracted from the author co-citation analysis.

Shared Cognition

This section on shared cognition is a further elaboration on the discussion of mental models in the previous section. Due to the increased reliance on teams in the workplace, they are typically called upon to "perform complex cognitive processes" to facilitate "decision making, situation assessment, and design" (Cooke, Stout, Rivera, & Salas, 1998, p. 215). As a result, mental models that are usually meant to explain the cognitive processes of individuals are now being assigned to further the understanding of teams. This means the subject of team cognition represents more than the sum of its parts and encompasses the cognitive processes assigned to the team as a whole. As Hutchins (1995) puts it, the characteristics of a social organization usually generate recognizable variations between the properties of a single person and a team.

A common belief among many researchers is that effective teams hold or should hold similar mental representations (Rentsch & Woehr, 2004). Some of the latest research reveals "direct and indirect relationships between team effectiveness and common cognitions among team members" (Rentsch & Woehr, 2004, p. 11). This is an important point to consider because organizations can use this information to develop practical tools that will encourage its teams to move towards a shared cognition. Some researchers have suggested that when team members are able to openly communicate with each other, team mental models decrease in importance (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). In contrast, Mathieu et al. (2000, p. 274) argue that when environmental limitations are present, team mental models are crucial to

effective performance because they allow the members of the team to "predict the information and resource requirements of their teammates." As previously discussed, a team's capacity for flexibility allows it to thrive in uncertain environments.

In order to progress researchers towards the goal of making teams more effective by improving performance, researchers have a valuable resource at their fingertips in the form of the "team mental model construct" (Langan-Fox, Wirth, Code, Langfield-Smith, & Wirth, 2001, p. 99). Team mental models can provide practical insight into assisting industry and organizations comprehend the vibrant concepts surrounding teamwork and more specifically, the "how-to of measuring team mental models" (Langan-Fox et al., 2001, p. 99). Several researchers and proponents of "shared cognition" assert that personnel should "perceive, encode, store, and retrieve information in a parallel manner" to flourish together (Langan-Fox et al., 2001, p. 100). In other words, these individuals must possess a shared mental model, which expresses the similar cognitive processes acquired by a group of individuals.

Fiore and Schooler (2004, p. 136) focus on differentiating between the stages of "problem identification" and "problem conceptualization" in team scenarios. When team members initially discover the presence of a problem, this is problem identification. On the other hand, team conceptualization occurs when the team offers a description and diagnosis of the problem that has been identified in the earlier stage. In order to be effective, a significant majority of the comprehension of the problem should require overlap among the members of the team. This applies to team cognition because "without a shared understanding of what the problem is, not only may a team be solving

the wrong problem, but they also cannot make full use of their resources, the very reason teams are assembled in the first place" (Fiore & Schooler, 2004, p. 137)."

Environment

In order to gain a full understanding of team cognition, researchers must observe how the team operates in its natural surroundings (Hutchins, 1995). Can important conclusions and findings about team cognition be gathered in a laboratory? Yes, however, a more inclusive grasp of the subject matter will be discovered once researchers begin to understand it within a natural environmental context. As a result, the motivation of researchers has increased and they have begun to investigate this topic more thoroughly. For instance, Gievre and Moffatt (2003, p. 304) assert that in many cases an individual must work with the physical, external environment to make sense of a situation. An example of this type of scenario is evident when a student must use his or her cognitive processes to balance a chemistry equation on an exam. To achieve success, the student must apply his or her knowledge of chemistry to the equation on the exam. More specifically, the individual cognitive processes of the student are combined with the external environmental to complete the objective of balancing the overall equation.

In the book, *Team Cognition: Understanding the Factors that Drive Process and Performance*, Espinosa, Lerch, and Kraut (2004, p. 107) identify some key insights they call "explicit" and "implicit coordination." Explicit mechanisms usually involve the physical communication (i.e. verbally, in writing, formally, informally) of a team member or by tasks such as schedules, plans, and procedures in order to manage task dependencies. On the other hand, implicit processes typically include the unconscious coordination of team members through knowledge sharing. The authors suggest that in

order for a team to function effectively, it should "understand how explicit and implicit mechanisms complement and interact with each other" (Espinosa et al., 2004, p. 107).

Similarly, Clark (1997, p. 73) suggests two methods in which unique events can emerge from "collective activity." He refers to these methods as "direct and indirect emergence" (Clark, 1997, p. 73). Direct emergence mainly focuses on the characteristics and the interactions that take place between the individual elements. The existing environment encountered during direct emergence functions as a small, background role. On the other hand, indirect emergence takes into account "complex environmental structures" that serve as an intermediary between the previously mentioned individual elements (Clark, 1997, p. 74). Clark acknowledges the difficulty in absolutely differentiating between these two methods since each include environmental influences somewhat; however, this does not diminish the importance of distinguishing between the two approaches. From these research efforts, it is apparent that similar concepts on team cognition are being attacked from different angles. These books also make known the inadequacy of a unified glossary of team cognition vocabulary that is shared by all cognitive scientists. Topic overlap is a reoccurring observation that continually appears throughout this paper.

Awareness

Awareness is another common topic discussed among researchers of team cognition. In order to successfully employ this technique, the members of the team need to be actively engaged in team affairs. Awareness is a foundational concept that encompasses certain characteristics such as "using environmental cues to establish a common ground of understanding, seeing who is around and what they are doing,

monitoring the state of artifacts in a shared work setting, and noticing other people's gestures and what they are referring to" (Gutwin & Greenberg, 2004, p. 177). Although many researchers have perceived "situation awareness (SA)" to reflect an individual cognitive product, Gorman, Cooke, and Winner (2006, p. 1314) suggest that it is more of a "pre-reflective process of adaptation." With this in mind, the common view of "team situation awareness (TSA)" follows the traditional notion of SA and evaluates the dynamic knowledge of the team members (Gorman et al., 2006, p. 1313). However, Gorman et al. (2006) assert that to accurately assess the TSA of a team, it must be evaluated on how well it responds to environmental changes that challenge the preconceived notions of the team. Likewise, Artman and Waern (1999, p. 245) propose that "mutual awareness" is a term defined to refer to an individual member's knowledge of another's workload as well as a conscious assessment of the other individual's need. These notions are beginning to help researchers in their quest to improve team performance.

Coordination/Communication

Another common topic found throughout team cognition literature is the emphasis on coordination at the team level. "Team-member interactions" serve to form an accurate picture and represent the properties of a team (Gorman, Cooke, & Winner, 2006, p. 1313). In contrast, if the characteristics of an individual team member were analyzed, they would not predict the capabilities of the team. As a result, Gorman et al. (2006, p. 1314) propose that "team coordination processes" are able to model the "perceptual and action capabilities of highly interdependent team members." In order to further refine the understanding of team cognition, the knowledge of team coordination should be

improved. Teams should be aware of the great impact coordination activities have on the overall outcomes of team performance (Salas & Fiore, 2004). With this in mind, it is necessary for teams to take an active role in understanding and applying knowledge of coordination to the efforts of the team. The goal of this application is to achieve synchronized actions among the individual members of the team. These research efforts indicate certain weaknesses in the functioning of many teams; however, this knowledge provides insight into methods to progress team performance.

Communication is included in this subsection because it complements the concept of coordination. Mathieu, Heffner, Goodwin, Salas, and Cannon-Bowers (2000, p. 274) point out that the members of the team must acquire shared conceptions and the details of how the team works together. At the heart of this responsibility is the concept of communication. As a team, many situations require it to become an "information-processing unit" that gathers and applies useful information in order to operate effectively (MacMillan, Entin, & Serfaty, 2004, p. 61). Consequently, MacMillan et al. (2004, p. 61) contend that "team cognition requires communication." Through the analysis of a team's communication, extensive information is usually provided about its shared cognition (Levine & Choi, 2004). This will preserve the shared mental model that the team has worked hard to develop (MacMillan et al., 2004). In addition, communication may reveal how shared cognition alters over the course of time (Levine & Choi, 2004). As a result of this research, it is apparent that team communication is an essential component of good performance.

Practical Studies Completed on Team Cognition

This section of the literature review will analyze several practical studies completed by various authors interested in the area of team cognition research. Useful information and knowledge will be gleaned from these studies in order to gain a greater understanding of the topic. Although the details of these studies will be described to some extent, the focus of this section will be to communicate the important takeaways useful for this research. In other words, these studies are intended to represent only a small sample of the actual number of studies available within team cognition literature. With this in mind, the studies will inform the taxonomical classification effort and grouping processes that will occur later in the research. These studies provided contextual knowledge necessary to effectively complete the factor analysis and multidimensional scaling in chapter four.

MacMillan, Entin, and Serfaty

MacMillan, Entin, and Serfaty (2004) set up two experiments in order to further substantiate some of the concepts discussed in the previous sections such as coordination and communication. The first experiment sought to discover the most favorable "team" makeup for a "Joint Task Force team" (MacMillan, Entin, & Serfaty, 2004). Team makeup refers to the hierarchy of the team (who reports to whom) as well as how the team distributes its tasks, responsibilities, and resources to accomplish its mission. The second experiment modeled a "humanitarian assistance airlift mission" to evaluate how an "electronic collaborative planning tool" affected team performance. In many aspects these experiments were different; however, an adequate number of similarities existed to develop an overall picture that provided insight into "how team structure affects the

communication behaviors" that are inherent to effective team performance. These experiments are evidence of useful progress within the research area of team cognition.

As a result of these two experiments, the authors were able to draw some interesting conclusions. The findings from experiment one yielded results suggesting that team performance is improved when the "need for coordination" and the "communication rate" are minimal (MacMillan, Entin, & Serfaty, 2004). These conclusions are based on the composition of the optimal team structure, which required small amounts of communication and coordination; however, the team performed more effectively than the team required to use more communication and coordination. Although communication and coordination are essential aspects of team cognition, MacMillan, Entin, and Serfaty (2004) discovered that they come at a cost. In order to perform most effectively under similar circumstances, the teams must find a delicate balance between communication and coordination.

The findings from experiment two also reveal some additional information that will be useful for future research on team cognition. This experimented demonstrated the importance of effective preplanning to increased team performance (MacMillan, Entin, & Serfaty, 2004). In other words, not only is collaborative planning essential to a team's success, but the quality of the collaboration time is crucial to a team's effectiveness. The team that was more effective in this experiment was provided an "electronic whiteboard," which helped to ease the communication among the members of the team during planning stages. As a result of this collaboration, the authors assert that the team's performance with the whiteboard was higher than the team without the whiteboard because it was able to "increase the team's shared mental model." As predicted, this

experiment provided useful knowledge that will act as a catalyst for future research on team cognition.

Hutchins

> [Modern tidal theory] is far beyond the reach of the modern navigator. Sailors today have no need to understand tidal theory at any level. They merely consult their tide tables anew for each voyage (Hutchins 1995, p. 173).

Aboard various U.S. Naval ships, Hutchins (1995) investigated matters of team cognition through "firsthand observations of navigation practice at sea." His book, *Cognition in the Wild*, contains numerous examples and insights that are practical to the application of the team cognition subject matter. The focus of this portion of the literature review will expound upon the important conclusions or findings drawn by Hutchins over the course of his study.

Before analyzing Hutchins' findings on team or distributed cognition throughout his investigations aboard the naval ships, he begins by emphasizing the importance of the concept. When speaking in teams of human labor, the characteristics of the group are usually distinctly different than the "properties of individuals" (Hutchins, 1995, p. xiii). Hutchins (1995, p. xiii) uses the "energy budget" and efficiency of the team and their interactions with the physical environment as a foundation for this distinction. As a result, Hutchins (1995, p. 176) claims that a "social organization of individuals" is more effective in its endeavors than an individual person. Distributed cognition allows both "physical and cognitive labor" to be completed by coordinating the actions of the participants. For example, the act of two individuals that are "driving a spike with hammers" into the ground exhibits how even an elementary task uses the aspects of distributed cognition because the small team must coordinate its activities. In fact, teams

may possess cognitive properties that do not reflect the same qualities as those that are possessed by an individual within the group. The tasks completed within most teams require interpersonal communication among the members of the team in order to be effective. This concept is in contrast to the communication that resides within a person such as individual memory. For these reasons, it is necessary to take a close look at how these concepts operate in practical situations.

In order to describe how team performance is affected by cognition, Hutchins describes some of the interactions among the members of navigational teams aboard the ship. Hutchins (1995) makes the point that the knowledge to complete any one of the responsibilities used to navigate the ship is not located within a specific person. Instead, each member of the navigation team works together to accomplish the necessary duties. In other words, a subjective transfer of knowledge occurs among the members of the team. Hutchins (1995, p. 219) relates this human process to a "malleable and coordinating tissue" and its function is to manage the completion of the proper activities. When the navigation team encounters various "computational media," it jointly communicates and utilizes the environmental resources to effectively accomplish the mission. In essence, the team members share their "representational states" of their external environment to achieve coordination throughout the navigational process. For example, two sailors interact with each other and use the navigation chart table along with other equipment to determine the ship's direction. This task was completed without verbal communication; the men recognized what needed to be accomplished and coordinated with each other throughout its duration.

In order to provide the reader with a full understanding of the properties of a team, Hutchins continues to expound on his observations and conclusions made on the naval ship. Hutchins (1995, p. 224) emphasizes the importance of the "social structure" that takes place within the division of labor. He asserts that the performance of the team is intricately tied to the establishment of "real human relationships." These relationships are developed from a social structure that acts as a framework where communication occurs and standards are developed for proper social interactions. For instance, a new member of the navigation team would be expected to perform the task at a certain level so as to justify a membership in the social world among the rest of the team members. Each team, Hutchins (1995) suggests, has a couple of cognitive properties that distinguish it from any one single person. The first property focuses on how the characteristics of a team are affected by the environment or as Hutchins (1995, p. 226) puts it, "the tools of the trade." As discussed earlier, the second property that affects the makeup of a team is the distributed cognition that occurs within its social organization. It is important to note that in most cases, individuals within teams possess "overlapping knowledge" and this attribute allows the team to adapt to meet the challenge (Hutchins, 1995, p. 227). Going back to the human tissue analogy, the members of the team can be flexible, like a tissue, and their representational states can conform to meet the task at hand. In addition, this behavior usually provides the members of the team with the capability to compensate for any deficiencies necessary to prevent failure. These are some of the main attributes Hutchins was able to assign to the characteristics of effective team work.

In summary, Hutchins identified the cognitive differences between an individual and a group of people (Hutchins, 1995). More specifically these differences are rooted in

how a single person or a team is changed as a result of technology and "the social distribution of cognitive labor" (Hutchins, 1995, p. 228). These findings that have been recorded by Hutchins help to establish the concept of distributed cognition. By performing this study, Hutchins demonstrates that distributed cognition is not just some nebulous concept that was developed by anthropologists and cognitive scientists. Rather, it is a subject matter that can potentially have a huge impact on how organizations can utilize teams to most effectively accomplish the necessary work. This piece of work is also one of the launching pads leading to studies that focus exclusively on the particulars of how teams operate and perform, also known as team cognition. The impact of team cognition on the organizational world has yet to be realized; however, it is greatly beneficial to evaluate the existing research and show the current contributions of this subject matter.

Bierhals, Schuster, Kohler, and Badke-Schaub

According to Bierhals, Schuster, Kohler, and Badke-Schaub (2007, p. 76), past research on the team cognition aspect of "shared mental models (SMM)" has mainly concentrated on the study of structured tasks such as teams within the military. In order to begin to present different evidence, these authors chose to analyze teams that accomplish "design tasks." Since the focus of design teams is "complex problem solving," some of their inherent characteristics include ambiguous goals, lack of guidelines, and an ever-changing environment.

Bierhals et al. (2007, p. 79) proceeded to perform two studies that looked closely at how SMMs and team performance were affected in design teams. A sample of mechanical engineering students was chosen to take part in the first study, which sought

to evaluate the teams in the class according to SMM concepts. The second study was a little more realistic because it analyzed how the SMM was affected in the context of multidisciplinary project teams in the automobile industry. Each study had a common ground because each investigated a SMM from a "process-oriented perspective," which is characterized by how the members of the team interact with each other over time (Bierhals et al., 2007, p. 80). Due to certain limitations of studying cognition such as accessing the way individuals think, each study analyzed the team at an aggregate and a group level.

As the students approached the completion of their design in the first study, the results seemed to indicate that the members of each team did not agree on the given task and their area of responsibility (Bierhals et al., 2007). Since the exercise was extensive, the authors seemed to think that the students' disagreement may have been a result of the lack of motivation or unresolved individual conflict. As a result, Bierhals et al. (2007) concluded that the study needed to add specific aspects by taking into account "motivational and emotional processes." In the second study, higher performance was found to be caused mainly by the SMMs among team members as well as SMMs the team members had acquired on the process. Additionally, a major factor that differentiated the teams in terms of performance was the use of team communication in developing a SMM. As the scenarios became more challenging, the teams needed to explicitly voice their concerns to enable an adequate comprehension among all of the group members. Although the first study provided an understanding into "how team members organize knowledge in general," the latter study showed how the "team

member mental model and the process mental model" were crucial aspects of effective team performance in "complex problem-solving" (Bierhals et al., 2007, p. 90).

As a reminder, these studies were intended to give the reader a brief insight into the practical application of this topic. This section was not provided to encompass every aspect of team cognition because in the end, that is the purpose of the co-citation analysis.

Criticism of Team Cognition

The source of much of the criticism on team cognition is that it is an ambiguous and nebulous topic of research. Although a link between team cognition and team performance has been identified, the link is not strong because the understanding of team cognition, a difficult topic to measure, is limited (Cooke, Salas, Kiekel, & Bell, 2004). As previously mentioned, team cognition research lacks a well defined glossary of terms. Throughout the body of literature, it was common to have authors agree on the same name for a term, but they presented varying definitions. Similarly, it was also common to find authors that agreed on definitions, but they used different terminology for classification. These realities make it difficult for the area of research to progress forward. For these reasons, it is imperative to continue to develop and understand the subject of team cognition and its relation to team performance.

In a recent review, Salas and Fiore (2004) identify some noteworthy benefits to the team cognition construct. For instance, the nebulous and complex characteristics of the team process are better understood through this construct. Another benefit of this construct is to use it to forecast team performance. The last benefit is to use the

information gathered from the team construct to help analyze and eventually improve team performance for future applications.

Summary

This chapter has served to guide the reader through and draw attention to the important concepts within team cognition. At the same time, the chapter was framed upon and began to answer some of the research questions. In other words, the contextual knowledge gleaned from this chapter was immensely important to the completion of the prescribed methodology in the later chapters. In review, a few selected terms were defined to provide the reader with an adequate depiction of some of the critical topics. Following the identification of terms, some of the key themes mentioned by team cognition researchers were discussed. Next, several practical studies were implemented into this chapter to show that team cognition is not confined to philosophy or the laboratory. Like most research topics, team cognition has its weaknesses, but with more time and research, it is likely that the effectiveness of the subject will increase.

As discussed earlier, this chapter acts as the catalyst for the remainder of the research. The contents of this chapter not only serve as useful knowledge for the researcher as well as the reader, it also is directly applicable to completing the methodology. In order to complete the factor analysis, a crucial step in the methodology, requisite knowledge was essential to adequately assign titles to the factors. In addition, this knowledge of the research topic will be used extensively to more effectively map team cognition. Without a sufficient background and understanding of team cognition, these steps of the methodology would have been much more challenging. In other words, the groundwork completed in this chapter was practical for application in the last three

chapters of this methodology. As a result of the efforts in this chapter, the efficiency, effectiveness, and quality of this research effort will be improved.

III. Research Methodology

Introduction

Effectively executing the methodology will rely upon and the practical application of the knowledge gained in chapter two. The intent of this chapter is to specifically identify how the research questions will continue to be addressed. The questions are: (1) what authors have significantly impacted team cognition research, (2) what are the emergent themes within team cognition literature that can be identified, and (3) how has team cognition research evolved throughout its lifetime? This will be accomplished by discussing the specific details of the methods that will be used for this research project.

As previously identified, the bibliometrics method of analysis that will be used is an author co-citation analysis and will specifically deal with answering the first and second research questions. In order to accomplish this, the first co-citation analysis included all of the literature found in the *SSCI*. Through the years, many authors have contributed to the emergence of team cognition and as a result, they will be included in this portion of the methodology. To address the third research question, a co-citation analysis was performed for three specific time periods: 1990-1995, 1996-2001, and 2002-2007. These time period co-citation analyses were conducted in addition to the co-citation analysis that encompassed all of the literature. The dates were chosen based on the approximate year that team cognition publications emerged and for the purposes of this research endeavor, the year of publication was determined to be 1990. As stated in chapter one, the three additional co-citation analyses served to specifically investigate the contemporary evolution of the team cognition subject matter. Consequently, the time period analyses will only include research after 1990 because that is the approximate date

that the term “team cognition” emerged. To summarize, four distinct co-citation analyses were performed and these include: an overall co-citation analysis that includes all literature, an analysis that specifically focuses on publications written from 1990-1995, an analysis that specifically focuses on publications written from 1996-2001, and an analysis that specifically focuses on publications written from 2002-2007.

In order to perform the methodology most effectively, it seems reasonable to follow the guidelines of previous practitioners of the author co-citation analysis technique. As a result, the research efforts of Low, McCain, and Culnan will be referred to in order to create the best possible product. McCain (1990) clarified the author co-citation analysis process by releasing a journal article that specified each step. Culnan’s (1986) article was also an effective gauge of the research and will help to further guide the effort. Each of these resources will help address the previously mentioned research questions.

Selection of the Author Set

When a definition of author co-citation analysis was provided in chapter one, it alluded to the importance of generating a list of quality authors to perform the bibliometric technique. Thus, before the author co-citation analysis began, it was essential to identify influential authors among the available publications on team cognition. One of the important points that McCain (1990, p. 433) stresses about this section of the methodology is that “it is critical to establish a diversified list of authors.” Unless the authors selected “captures the full range of variability” within the subject matter, the accuracy of the research effort will be compromised because the results produced did not rely upon a representative sample. McCain (1990) suggests a variety of

sources from which the list of authors can be formed. These sources include "personal knowledge, consultation with researchers in the area studied, surveys, textbooks, histories, scholarly monographs, organizational membership and conference attendance rosters, and review articles" (McCain, 1990, p. 434). For the purposes of this endeavor, the author list was selected by consulting researchers. The reason for this decision stems from the researcher's relatively low level of knowledge on team cognition subject matter. In order to accomplish this, a list of notable personnel was developed from several different sources within the realm of the subject matter. The list of contacted authors is included in Appendix A, *Contacted Scholar Information*. Once the list was compiled each person was contacted through a personalized message and if interested, asked to provide information needed to continue with the methodology. Each person contacted was asked to provide the "most influential authors, manuscripts, and journals" within team cognition.

According to Low (2007), creating a list of authors for the co-citation analysis using the previously described technique has several advantages and disadvantages. Most importantly, the technique enables an "inexperienced researcher" on the subject of team cognition to develop a dependable list of authors from reliable sources that can be used to conduct the co-citation analysis. In addition, the level of information provided by the scholars requires them to exert a minimal amount of time and effort. As a result, it is more likely the personnel will respond. One of the disadvantages indicated by Low (2007) asserts that a certain level of "bias" may be factored into the creation of this list. For instance, the contacted personnel may work for or have experience with various publishers and as a result, the personnel tend to favor the authors from these publishers.

Retrieval of Author Counts

An important aspect of the author co-citation analysis is to select an effective database that will retrieve the citation counts. The word "effective" refers to a database that makes available the highest amount of publications on the subject matter, has the capability of performing a co-citation count, and is locally accessible. With this in mind, the Social Sciences Citation Index (*SSCI*) is the best option to complete the work. According to Thomson Scientific (2007), the *SSCI* database supplies "retrospective bibliographic information, author abstracts, and cited references" on over 50 disciplines from 1,700 of the most notable social science journal across the globe. As a result, it was appropriate to gather data about team cognition, a social science subject matter, from this database. By using this electronic database, the highly inefficient method of gathering data manually will be avoided. The *SSCI* database also has the capability of performing citation and co-citation counts. Even though this capability comes with certain limitations that will be discussed throughout the remaining chapters, the *SSCI* provides a distinct advantage. The use of the *SSCI* database acts as a reliable medium in which to perform the initial steps of the methodology.

Perform Citation Searches

Since the *SSCI* is the preferred database, the next step is to begin to extract the data by performing the citation searches. Below a description will be provided of the initial citation search and the subsequent co-citation search. Throughout these searches, it is important to keep in mind that "authors are being used as surrogates for the ideas represented by their publications" (Culnan, 1986). The list of authors obtained from the

author selection section was implemented and will be applied in a similar manner to the research effort on change management accomplished by Low.

Citation Search

Using the author list obtained from the team cognition "experts," a citation search was performed for each co-citation analysis mentioned in the beginning of the chapter. This search provides a temporary indication of each author's influence and if needed, inconsequential authors are removed. A citation search within the *SSCI* yields the number of times an author was referenced by various publications. For the purposes of this study, authors cited less than 30 times were eliminated from the author list (Low, 2007). Some of the authors included in the original author list may have a minimal impact on team cognition and incorporating these authors may skew the results. These citation searches created a stable platform of authors to develop answers for the three research questions.

Co-citation Search

The next step of this section was to perform the author co-citation count. In order to obtain the data for an author co-citation analysis, the preferred database, *SSCI*, must be used to count the number of times a publication cites a pair of authors' names (McCain, 1990). More specifically, "Boolean operators" were used to combine a pair of individual citation searches, which would yield the co-citation counts needed for the remainder of the analysis (Low, 2007, p. 23). The completion of the next steps in this chapter hinge on the collection of these co-citation counts.

Although these procedures appear logical, the configuration of the *SSCI* presents a notable limitation. When an author's name is entered into the *SSCI* database the results

usually provide the researcher with numerous publications that include authors with the same last name and first initial. In order to effectively narrow this search down to the intended author, the middle initial of the author, must be known. Sometimes the author does not have a middle initial and sometimes the author has the same middle initial as another author. When the co-citation search is performed with the Boolean operators, this problem is usually resolved because in most cases, authors only cite authors from the similar research interests. However, this is not always the case and therefore, it is important to identify this shortcoming in the *SSCI* database.

Compilation of Raw Co-citation Matrix

As the author co-citation counts are gathered, it is necessary to enter and organize the information into a chart referred to by McCain (1990, p. 434) as a "raw co-citation matrix." This data extraction method takes the co-citation counts and enters them into a "matrix with identically ordered authors' names on the rows and columns." The purpose of this organized matrix is to effectively represent the data so it can be easily implemented into the latter stages of the author co-citation analysis process.

Although this stage of the methodology section may seem simplistic, a few concerns are apparent and must be addressed. The method used to code the "diagonal cells" in the co-citation matrix presents a problem because it may produce misleading data (McCain, 1990). This misrepresentation appears as a result of the confusion over what to include in these diagonal cells. For instance, these cells can be filled with zeros or the total number of times an author cites. The first solution is not a good option because the correlation matrix to be completed in the next step would be incorrect. The latter solution could be misleading because some authors have extremely large citation

counts and as a result, those authors would have disproportionately large diagonal values (White & Griffith, 1981, p. 165). McCain (1990) asserts that this error could inadvertently compounds in the later steps of the analysis. White & Griffith (1981, p. 165) suggested employing a technique that divides the sum of the three greatest co-citation counts by two. This helped to identify the "relative importance of a particular author." Once calculated, these diagonal values were used to compare and contrast the authors.

Profile Analysis

Once the raw data matrix is complete for each author co-citation analysis, the next step is to transform it into a "correlation matrix," which demonstrates the "similarity or dissimilarity of author pairs" (McCain, 1990, p. 435). According to McCain (1990), the use of a correlation matrix has two distinct advantages. Not only does the correlation coefficient show the frequency that a pair of authors is co-cited, it also indicates the similarity of their co-citation profiles. In other words, "two authors who are always cited highly with certain third authors, but infrequently with others, have a high positive correlation" and appear to be related when compared across the author population (McCain, 1990, p.436). Below in Table 1, *Correlation Matrix Example*, is a sample correlation matrix that was created with a small portion of the authors that will be used in the final analysis.

Table 1. *Correlation Matrix Example*

	Salas	Fiore	Rentsch	Woehr	Hinsz	Entin	Serfaty	Cooke	Kiekel	Bell
Salas	1.000	.485	.785	.367	.809	.232	.353	.795	.208	.569
Fiore	.485	1.000	.512	.427	.588	.305	.419	.668	.305	.257
Rentsch	.785	.512	1.000	.570	.776	.189	.281	.764	.339	.276
Woehr	.367	.427	.570	1.000	.649	.154	.246	.469	.062	.306
Hinsz	.809	.588	.776	.649	1.000	.271	.381	.655	.263	.478
Entin	.232	.305	.189	.154	.271	1.000	.972	.279	.333	.032
Serfaty	.353	.419	.281	.246	.381	.972	1.000	.408	.390	.165
Cooke	.795	.668	.764	.469	.655	.279	.408	1.000	.602	.328
Kiekel	.208	.305	.339	.062	.263	.333	.390	.602	1.000	-.061
Bell	.569	.257	.276	.306	.478	.032	.165	.328	-.061	1.000

Hinsz and Salas have a correlation coefficient of 0.809. This coefficient is a high positive correlation and indicates that Hinsz and Salas are “co-cited frequently or infrequently with the same authors” (McCain, 1990, p. 436). On the other hand, Kiekel and Bell have a coefficient of -0.061. This suggests that the two authors have different research interests and therefore have different co-citation patterns. Although some authors may be cited more frequently than others, the correlation coefficient places all of the author pairs on the same level by removing differences in scale. As a result, authors with high co-citation counts can be compared to authors with low co-citation counts.

Multivariate Analyses

Upon completion of the citation and co-citation searches, a factor analysis and multidimensional scaling (MDS) analysis were performed on the subsequent data. As stated earlier these techniques are effective in presenting the data gathered and compiled in the matrix. These tools also assist the researcher in interpreting the overarching implications of the study.

Factor Analysis

A factor analysis is a common tool available to a person performing an author co-citation analysis. This technique of analyzing and displaying data effectively complements the MDS method (McCain, 1990, p. 440). A factor analysis creates variables that allow the researcher to more easily expound upon the associations in the original set of variables. As a result, a "factor" is determined according to the "subset of authors loading on it" and emphasizes the underlying subject matter. In other words, authors that play a large role in the development of the factor are included in the factor subset. In general, the purpose of a factor analysis is a "means to reduce a set of observations to a smaller set of factors that capture the overlap and similarities between the unique observations" (Low, 2007, p. 25). The advantage of a factor analysis is its ability to discover the "breadth of contributions by authors who load substantially on more than one factor" (McCain, 1990, p. 440).

The methodology used by Low (2007) was referred to often and served as a guide throughout the completion of the factor analysis. Based on the factor analysis recommendations offered by Conway and Huffcutt and Ford, MacCallum, and Tait, a specific form of the factor analysis was chosen for the purposes of this research effort

(Low, 2007, p. 24). More specifically, the principle axis method and varimax rotation were used to analyze the co-citation matrix discussed in the previous section. This produced a chart that showed which authors are loaded onto which factors. Generally, each author is assigned to one factor; however, the chart also indicated which authors "contribute to more than one factor" (McCain, 1990, p. 440). In addition, a scree plot and an eigenvalue criterion were used to determine how many factors would be retained (Low, 2007, p. 25).

The initial results for each of the four factor analyses depicted a large number of factors that could represent the team cognition literature domain. After carefully considering the validity of each factor, many of the factors located near the end of the list were comprised by, at most, a few authors. This was cause for concern because factors with a low number of authors may not represent a legitimate factor (Low, p. 38). In situations like this where the number of factors is questionable, Tabachnick and Fidell (2001, p. 621) suggest to conduct a number of factor analyses. For each factor analysis, the number of factors should be specified. When an adequate number of factors have been determined, the correlation data results can be analyzed to decide if each factor is legitimate. This is accomplished by comparing the correlation coefficients among the authors under consideration. For example, if the authors are highly correlated with each other ($r > 0.70$), but they are not highly correlated with any other authors, then the factor is substantiated. If the author's correlation coefficients do not meet these standards, then the factor is "poorly defined." Tabachnick and Fidell (2001, p. 621) assert that "interpretation of factors defined by only one or two variables is hazardous." In order to

reduce the factors to a reasonable number, the logic above was applied to each author co-citation analysis.

Once the final list of factors was chosen, each factor was analyzed so that it could be classified according to the overall theme. Initially, the theme for each factor was to be determined by reviewing the titles and abstracts from the following two sources: the publications written by the authors loaded onto each factor and the publications that co-cite the authors loaded onto each factor. After further consideration, the decision was made to abandon this method for two reasons. First, the list of references to review would be exhaustive and it would be unreasonable to categorize the lifetime publications of up to 30 authors into one single theme. Many of the authors have written articles on numerous topics and compartmentalizing the accumulation of these documents into one topic would be inaccurate and misleading. Second, a minimal amount of team cognition research experience prevents the researcher from accurately discerning a representative theme for each factor. Prior knowledge and experience is a necessity when reviewing and categorizing such a large amount of papers.

As a result of the reasons listed above, the initial method to determine the title of each factor was replaced. The new method consisted of gathering articles by extracting information from the factor loadings and the *SSCI* database. More specifically, documents that cited the authors possessing the five highest factor loadings together were chosen. The main purpose of using this method is to reduce, as much as possible, the amount of subjectivity needed to classify each factor. Reducing the number of reviewed articles to a manageable size reduces the complexity of detecting consistent themes, thus simplifying the process of naming each factor. Once the articles were obtained and

organized into the *RefWorks* software, the titles and abstracts were reviewed according to each factor. For each factor, the highest number of articles that would be reviewed is 10 even if more than 10 articles met the above qualifications. For example, if 25 reviewed articles cited the five authors with the highest factor loading, the first 10 articles appearing in *RefWorks* were reviewed. A sample size of 10 articles was determined to be sufficient to represent the combined research interests of all the authors that loaded onto to the factor. In other words, when each of the 10 documents cites five important authors together, the publications should provide enough focused information to name the factor. If the factor has less than 10, but greater than five documents that cite the authors possessing the five highest factor loadings together, then the articles will still be reviewed to name the factor. If the factor has five documents or less, then documents will be reviewed with authors possessing the four, three, or two highest factor loadings together. In most cases, reducing the number of authors cited together will increase the number of articles; however, this procedure will also decrease the reliability of the factor name. This is a recognized, but accepted weakness of the factor naming procedure. These guidelines will serve to focus and accurately capture the main research interests of the authors in each factor.

Table 2, *Factor Analysis Example*, is a SPSS output of a small scale factor analysis example. Each author was placed onto the best fitting factor. In a couple of cases, authors were shown to contribute to more than one factor. The next step in this example would be to sift through the team cognition literature written by the corresponding authors and categorize each factor.

Table 2. *Factor Analysis Example*

	Author Factor Loadings		
	1	2	3
Hinsz	.892		
Salas	.877		
Rentsch	.825		
Cooke	.756		.550
Woehr	.693		
Bell	.664		-.448
Fiore	.613		
Entin		.977	
Serfaty		.957	
Kiekel			.854

Multidimensional Scaling

The next step in this section of the chapter was the completion of a multidimensional scaling (MDS) map. As stated by Borg and Groenen (2005, p. 1) an MDS "is a method that represents measurements of similarity (or dissimilarity) among pairs of objects as distances between points of a low-dimensional multidimensional space." A MDS map uses various methods to develop "visual displays" from the previously created correlation matrix in order to more effectively study the subject matter (McCain, 1990, p. 437). Within the traditional confines of an author co-citation analysis, MDS forms an "information-rich display" of the co-citation relationships and indicates the "salient dimensions underlying their placement." For instance, authors that receive a higher count of co-citations are more centrally placed, whereas authors with fewer counts are positioned at a greater distance from the other authors. Each author is represented by a point on the literature map and the closer the points are together, the greater the similarity between the authors (McCain, 1990, p. 438). Once this is understood, a person can visualize and easily identify relationships between the authors and subjects. Depending on the intent of the research, "cluster boundaries" are drawn around groups of

authors that encompass certain concepts or topics found within the specified literature. In addition, the axes of the MDS need to be labeled. According to Garson (2006), the process of labeling the axes is ambiguous and subjective procedures are used by the researcher to "eyeball the perceptual maps and infer dimension labels." A MDS map is easy to read because it is reduced to two, sometimes three dimensions.

According to McCain (1990, p. 439), most author co-citation analyses concentrate on a two-dimensional product because it includes at least "85% of the variance." McCain (1990, p. 439) provided an example of an MDS map in the process to help the reader visualize this portion of the analysis and is indicated on the next page in Figure 2, *MDS Map Example*. In the example, each solid line shape surrounding a group of authors represents a factor, which denotes the similarity between the authors. As stated before, the closer a pair of authors are together, the higher their similarity. This is a two dimensional axes and each dimension is defined and chosen by the researcher according to the specific layout of the factors. In this case, the horizontal axis refers to the subject and the vertical axis refers to the style of work. This particular example of an MDS map shows definitive separate boundaries around each factor. As mentioned in chapter one, one of the large assumptions of this methodology is that the authors write in specific areas and are separated according to their assigned factor. Consequently, when the MDS map is created, the authors will be arranged in such a way that an observer could easily determine the research interest of an author. It is important to note that in some cases, the research interests of the authors will overlap. When this occurs, the boundaries between the authors and the factors are more difficult to identify. This subject is discussed in further detail in the last two chapters.

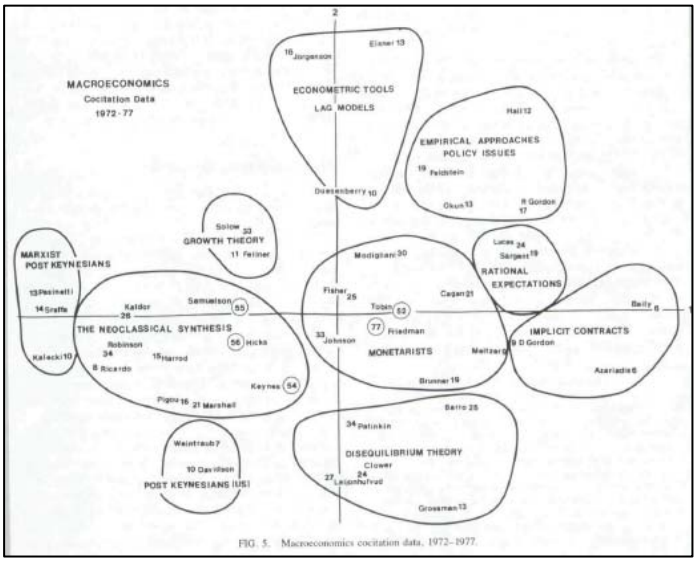

Figure 2. MDS Map Example

Summary

The purpose of this chapter is to specifically define the stages and the reasoning behind conducting a co-citation analysis. The methods used by several researchers were referenced and used as directives throughout the process. By providing the reader with a detailed explanation of each step in the author co-citation analysis process, he or she will more easily comprehend the discussion that will take place in the next few chapters. In other words, this chapter has served as the foundational knowledge critical to understanding the impact of this research.

In summary, the starting point of the methodology was to collect an appropriate list of authors' names by contacting authors, editors, and article reviewers within the subject matter of team cognition. Using the *SSCI* database, citation and co-citation searches were conducted with the list of authors' names received in the previous step. The results from the co-citation search were organized into a matrix that serves as the

building block for the remaining steps of the methodology. This matrix was used to present and examine the data by employing several techniques such as a correlation matrix, factor analysis, and a MDS map.

IV. Results

The purpose of this chapter is to present the findings obtained from the four co-citation analyses discussed in chapter three and begin to address the research questions. To present this material effectively, the chapter will be divided into four distinct sections. The first section, "Selection of the Author Set," will cover how the final list of team cognition authors was determined. The second and third section, "Citation Searches" and "Co-citation Searches," will explain the results received when the citation and co-citation searches were conducted. These sections will combine the "Perform Citation Searches, Compilation of Raw Co-citation Matrix, and Profile Analysis" sections discussed in chapter three's methodology. The fourth section, "Multivariate Analyses," will discuss how the data gathered in the previous section was used to perform a factor analysis and develop an MDS map. In addition, the results from each factor analysis and MDS map will be reported.

Selection of the Author Set

Using the methodology prescribed in the previous chapter, an extensive author list was created. Initially, a personalized electronic letter was individually sent to 45 scholars asking for specific information about the subject matter. As previously mentioned, these scholars were selected from authors of journal articles, authors of books, listed references, and staff members from journals that publish team cognition material. As a result, the demographic of these scholars was highly diverse and included editors of journals, professors from universities all over the United States, and even scholars from Australia, England, Canada, and Germany. A total of 23 authors responded to the request for information, which yielded a response rate of response rate of 51%. The spectrum of

these responses was large and diverse. Eight scholars indicated that they did not want to take the time to assist in this research endeavor, while others were more than willing to share as much relevant information as they could on the topic. Most of the latter scholars provided information that ranged from a short list of a few authors to an extensive list of numerous authors. The latter responses provided information for each of the requested categories. A copy of the letter sent to the scholars can be found in Appendix B, *Letter to Team Cognition Scholars*. A summary of the information provided in the responses can be found in Table 3, *Summary of Information Received from Contacted Scholars*. After sifting through the messages and considering the authors encountered throughout the literature review, the total author count included 96 authors. This author list serves as the foundation for the author co-citation analysis.

Table 3. *Summary of Information Received from Contacted Authors*

Influential Journals
Human Factors
Organizational Behavior
Journal of Management
Psychological Bulletin
Journal of Organizational Behavior
Simulation in Healthcare
Human Performance
Journal of Applied Psychology
Military Psychology
Organizational Behavior and Human Decision Processes
Behavioral Research Methods
Organizational Research Methods
Group Dynamics
Influential Books
Making decisions under stress: Implications for individual and team training (Cannon-Bowers & Salas, 1995)
Infotopia (Sunstein, 2006)

Table 3 (Cont.)

Cognition in the wild (Hutchins, 1995)
Team Cognition: Understanding the factors that drive process and performance (Salas & Fiore, 2004)
Turtles, termites, and traffic jams (Resnick, 1997)

Influential Journal Articles
"Enhancing the effectiveness of work groups and teams" (Kozlowski & Ilgen, 2006)
"Shared mental models in expert team decision-making, in individual and group decision-making: current issues" (Cannon-Bowers, Salas & Converse, 1993)
"Team mental model: Construct or metaphor" (Klimoski & Mohammed, 1994)
"Team mental models: Techniques, methods, and analytic approaches" (Langan-Fox, Code & Langfield-Smith, 2000)
"Groups as information processors" (Hinsz, Tindale & Vollrath, 1997)
"Team mental models in a team knowledge framework: Expanding theory and measurement across disciplinary boundaries (Mohammed & Dumville, 2001)
"A model of inter and intra team situational awareness: Implications for design, training, and measurement" (Endsley & Jones, 2001)

Citation Searches

Once the author list was finalized, the *SSCI* database was used to perform the initial citation searches. The initial author list can be viewed in Table 4, *Initial Co-citation Author List*.

Table 4. *Initial Co-citation Author List*

Acton B	Gualtieri JW	Milanovich DM
Amazeen PG	Gully SM	Millward LJ
Andrews DH	Gutwin C	Mohammed S
Artman H	Heffner TS	Morris NM
Baker DP	Helm EE	Ocasio W
Bandura A	Hinsz VB	Oser RL
Banks AP	Hollenback JR	Paris CP
Bell BS	Hollingshead AB	Pedersen HK
Blickensderfer E	Hutchins E	Prince C
Bowers CA	Ilgen DR	Rentsch JR
Brehmer B	Jentsch F	Ricci KE
Burke CS	Jundt D	Rouse WB

Table 4 (Cont.)

Cannon-Bowers JA	Kiekel PA	Ryan AM
Chuang YT	Klein G	Salas E
Clark A	Klein KJ	Schooler JW
Code SL	Klimoski RJ	Seifert CM
Connor OO	Kozlowski SWJ	Shapira Z
Converse SA	Kraiger K	Shope SM
Cooke NJ	Kraut RE	Smith-Jentsch K
DeJoode JA	Langan-Fox J	Spector PE
Dumville BC	Langfield-Smith K	Stout RJ
Edmondson AC	Lant TK	Tannenbaum SI
Endsley MR	Laurence JH	Tindale S
Entin EE	Levine EL	Vollrath DA
Espinosa JA	Levine JM	Volpe CE
Fiore SM	Markman AB	Weaver JL
Fowlkes JE	Marks MA	Wegner DM
Goodwin B	Mathieu J	Winner JL
Goodwin GF	McBey K	Woehr DJ
Gorman JC	McNeese M	Zaccaro SJ
Gramopadhye AK	McPherson JP	Zedeck S
Greenberg S	Menon S	Zeisig RL

Co-citation Analysis 1 (inclusion of all literature)

Six authors received zero citation counts and 20 authors had over 1,000 citation counts. Bandura was at the top of the list with 30,315 citation counts followed by Hollingshead with 11,312, Clark with 7,296, Klein with 3,327, and Spector with 2,924. Twenty-four authors received less than 30 citations (below the cutoff standard set in chapter three) and were removed. A total of 72 authors remained to perform the co-citation count. These 24 authors were also excluded from the time period analyses and the subsequent citation searches and tables. The complete list of all authors and their respective citation counts can be found in Table 5, *Rank Order of Single Citation Counts*.

Table 5. *Rank Order of Single Citation Counts*

Rank	Author	Citations	Rank	Author	Citations
1	Bandura A	30,315	49	Stout RJ	189
2	Hollingshead AB	11,312	50	Amazeen PG	152
3	Clark A	7,296	51	Heffner TS	134
4	Klein G	3,327	52	McNeese M	116
5	Spector PE	2,924	53	Millward LJ	110
6	Wegner DM	2,843	54	Goodwin GF	101
7	Greenberg S	2,633	55	Bell BS	98
8	Ilgen DR	2,150	56	Entin EE	97
9	Mathieu J	1,831	57	Gutwin C	87
10	Levine JM	1,682	58	Converse SA	81
11	Hutchins E	1,614	59	Fowlkes JE	79
12	Salas E	1,379	60	Burke CS	76
13	Zedeck S	1,322	61	Espinosa JA	76
14	Goodwin B	1,168	62	Jentsch F	75
15	Kraut RE	1,142	63	Milanovich DM	73
16	Schooler JW	1,108	64	Oser RL	63
17	Morris NM	1,047	65	Fiore SM	57
18	Brehmer B	1,046	66	Artman H	55
19	Ryan AM	1,041	67	Blickensderfer E	51
20	Klein KJ	1,025	68	Gramopadhye AK	50
21	Kozlowski SWJ	982	69	Dumville BC	46
22	Rouse WB	849	70	Jundt D	36
23	Markman AB	841	71	Volpe CE	33
24	Baker DP	791	72	Langfield-Smith K	32
25	Shapira Z	736	73	Tindale S	29
26	Bowers CA	683	74	Laurence JH	23
27	Zaccaro SJ	672	75	Gorman JC	22
28	Klimoski RJ	568	76	Chuang YT	18
29	Tannenbaum SI	522	77	Code SL	16
30	Prince C	461	78	Kiekel PA	10
31	Hinsz VB	449	79	McBey K	9
32	Kraiger K	439	80	Langan-Fox J	8
33	Levine EL	434	81	Banks AP	8
34	Lant TK	416	82	Acton B	8
35	Vollrath DA	412	83	Gualtieri JW	8
36	Mohammed S	397	84	Helm EE	4
37	Edmondson AC	392	85	Ricci KE	4
38	Gully SM	382	86	Hollenback JR	3
39	Endsley MR	335	87	Pedersen HK	2
40	Ocasio W	315	88	Winner JL	1

Table 5 (Cont.)

Rank	Author	Citations	Rank	Author	Citations
41	Menon S	312	89	Shope SM	1
42	Marks MA	304	90	McPherson JP	1
43	Seifert CM	238	91	Andrews DH	-
44	Rentsch JR	233	92	Smith-Jentsch K	-
45	Weaver JL	228	93	Connor OO	-
46	Woehr DJ	224	94	DeJoode JA	-
47	Cooke NJ	219	95	Zeisig RL	-
48	Cannon-Bowers JA	213	96	Paris CP	-

Co-citation Analysis 2 (1990-1995)

Of the list of 72 authors detailed above, 12 authors received zero citation counts and four authors had over 1,000 citation counts. Bandura was at the top of the list with 2,881 citation counts followed by Clark with 1,395, Mathieu with 1,225, Wegner with 3,327, and Hutchins with 990. Twenty-eight authors received less than 30 citations and were removed from further analysis for this time period; a total of 44 authors remained to perform the corresponding co-citation count. The complete list of all authors and their respective citation counts can be found in Table 6, *Rank Order of Single Citation Counts (1990-1995)*.

Table 6. *Rank Order of Single Citation Counts (1990-1995)*

Rank	Author	Citations	Rank	Author	Citations
1	Bandura A	2,881	37	Rouse WB	99
2	Clark A	1,395	38	Gully SM	88
3	Mathieu J	1,225	39	Vollrath DA	77
4	Wegner DM	1,142	40	Stout RJ	68
5	Hutchins E	990	41	Klimoski RJ	38
6	Spector PE	841	42	McNeese M	38
7	Salas E	827	43	Converse SA	35

Table 6 (Cont.)

Rank	Author	Citations	Rank	Author	Citations
8	Schooler JW	630	44	Levine EL	35
9	Levine JM	514	45	Menon S	27
10	Klein G	473	46	Heffner TS	26
11	Kozlowski SWJ	432	47	Weaver JL	22
12	Ilgen DR	401	48	Fowlkes JE	20
13	Greenberg S	396	49	Millward LJ	20
14	Tannenbaum SI	382	50	Gramopadhye AK	19
15	Lant TK	349	51	Jentsch F	12
16	Klein KJ	316	52	Oser RL	11
17	Hollingshead AB	296	53	Entin EE	6
18	Ryan AM	266	54	Fiore SM	6
19	Markman AB	261	55	Gutwin C	6
20	Brehmer B	253	56	Burke CS	2
21	Zaccaro SJ	237	57	Edmondson AC	2
22	Baker DP	225	58	Espinosa JA	2
23	Endsley MR	222	59	Jundt D	2
24	Shapira Z	215	60	Blickensderfer E	1
25	Kraut RE	213	61	Amazeen PG	-
26	Mohammed S	207	62	Artman H	-
27	Hinsz VB	203	63	Bell BS	-
28	Zedeck S	192	64	Cannon-Bowers JA	-
29	Prince C	186	65	Dumville BC	-
30	Rentsch JR	167	66	Goodwin B	-
31	Kraiger K	164	67	Goodwin GF	-
32	Bowers CA	149	68	Langfield-Smith K	-
33	Woehr DJ	136	69	Marks MA	-
34	Cooke NJ	119	70	Milanovich DM	-
35	Ocasio W	117	71	Morris NM	-
36	Seifert CM	111	72	Volpe CE	-

Co-citation Analysis 3 (1996-2001)

Two authors received zero citation counts for this time period and two authors had over 1,000 citation counts. During the co-citation analysis section, Gramopadhye and Amazeen received nearly all zeros in the matrix and as a result, they were removed. Bandura was at the top of the list with 4,472 citation counts followed by Clark with

2,095, Spector with 801, Ryan with 719, and Salas with 592. Since 16 authors received less than 30 citations and two authors were removed during the co-citation count, a total of 54 authors remained to perform the corresponding co-citation count. The complete list of all authors and their respective citation counts can be found in Table 7, *Rank Order of Single Citation Counts (1996-2001).*

Co-citation Analysis 4 (2002-2007)

Twelve authors received zero citation counts and zero authors had over 1,000 citation counts. During the co-citation analysis section, Schooler, Wegner, and Markman received nearly all zeros in the matrix and as a result, they were removed. Bandura was at the top of the list with 383 citation counts followed by Wegner with 198, Spector with 139, Edmondson with 134, and Klein with 127. Since 49 authors received less than 30 citations and three authors were removed during the co-citation count, a total of 20 authors remained to perform the corresponding co-citation count. The complete list of all authors and their respective citation counts can be found in Table 8, *Rank Order of Single Citation Counts (2002-2007).*

Table 7. *Rank Order of Single Citation Counts (1996-2001)*

Rank	Author	Citations	Rank	Author	Citations
1	Bandura A	4,472	37	Milanovich DM	75
2	Clark A	2,059	38	Rentsch JR	74
3	Spector PE	801	39	Woehr DJ	69
4	Ryan AM	719	40	Prince C	66
5	Salas E	592	41	Jentsch F	64
6	Markman AB	574	42	Millward LJ	63
7	Wegner DM	553	43	Cooke NJ	60
8	Klein G	523	44	Gutwin C	59
9	Mathieu J	431	45	Blickensderfer E	51
10	Greenberg S	404	46	Klimoski RJ	50

Table 7 (Cont.)

Rank	Author	Citations	Rank	Author	Citations
11	Klein KJ	391	47	Dumville BC	50
12	Levine JM	293	48	Kraiger K	48
13	Kozlowski SWJ	287	49	Seifert CM	41
14	Ilgen DR	264	50	Oser RL	40
15	Marks MA	256	51	Lant TK	38
16	Bowers CA	247	52	Volpe CE	32
17	Zaccaro SJ	236	53	Levine EL	31
18	Gully SM	230	54	Langfield-Smith K	30
19	Edmondson AC	227	55	Fowlkes JE	29
20	Ocasio W	220	56	McNeese M	29
21	Cannon-Bowers JA	215	57	Fiore SM	29
22	Schooler JW	213	58	Entin EE	27
23	Hollingshead AB	209	59	Artman H	26
24	Hinsz VB	187	60	Espinosa JA	24
25	Mohammed S	153	61	Brehmer B	22
26	Hutchins E	152	62	Weaver JL	22
27	Menon S	152	63	Burke CS	22
28	Vollrath DA	143	64	Rouse WB	20
29	Endsley MR	142	65	Zedeck S	18
30	Baker DP	125	66	Bell BS	18
31	Stout RJ	125	67	Morris NM	8
32	Kraut RE	113	68	Jundt D	1
33	Heffner TS	106	69	Goodwin B	-
34	Goodwin GF	94	70	Converse SA	-
35	Tannenbaum SI	93	71	Amazeen PG	Removed
36	Shapira Z	90	72	Gramopadhye AK	Removed

Table 8. *Rank Order of Single Citation Counts (2002-2007)*

Rank	Author	Citations	Rank	Author	Citations
1	Bandura A	383	37	Cooke NJ	12
2	Spector PE	139	38	Goodwin GF	11
3	Edmondson AC	134	39	Hinsz VB	10
4	Klein G	127	40	Gramopadhye AK	10
5	Kozlowski SWJ	127	41	Lant TK	9
6	Ryan AM	118	42	Rentsch JR	9
7	Gully SM	100	43	Oser RL	9

Table 8 (Cont.)

Rank	Author	Citations	Rank	Author	Citations
8	Ilgen DR	90	44	Clark A	8
9	Salas E	87	45	Brehmer B	7
10	Bell BS	83	46	Shapira Z	7
11	Zaccaro SJ	72	47	Ocasio W	5
12	Mathieu J	64	48	Rouse WB	5
13	Hollingshead AB	60	49	McNeese M	5
14	Klein KJ	54	50	Cannon-Bowers JA	5
15	Burke CS	52	51	Millward LJ	4
16	Mohammed S	36	52	Weaver JL	4
17	Jundt D	36	53	Jentsch F	4
18	Levine JM	35	54	Langfield-Smith K	4
19	Kraut RE	35	55	Seifert CM	3
20	Marks MA	31	56	Tannenbaum SI	2
21	Bowers CA	29	57	Fowlkes JE	1
22	Gutwin C	29	58	Goodwin B	-
23	Woehr DJ	27	59	Morris NM	-
24	Greenberg S	26	60	Vollrath DA	-
25	Baker DP	26	61	Stout RJ	-
26	Prince C	26	62	Levine EL	-
27	Fiore SM	26	63	Converse SA	-
28	Klimoski RJ	20	64	Entin EE	-
29	Zedeck S	18	65	Blickensderfer E	-
30	Kraiger K	17	66	Milanovich DM	-
31	Espinosa JA	17	67	Dumville BC	-
32	Amazeen PG	17	68	Volpe CE	-
33	Hutchins E	16	69	Artman H	-
34	Menon S	15	70	Schooler JW	Removed
35	Heffner TS	15	71	Markman AB	Removed
36	Endsley MR	12	72	Wegner DM	Removed

Co-Citation Searches

Upon completion of the citation searches, the final author lists were used to perform the co-citation searches. As with the citation searches, the results received from the co-citation searches were wide-ranging. For instance, a large number of the co-

citation counts were as low as zero. On the other hand, many of the co-citation counts exceeded 100. Once the co-citations counts were collected from the *SSCI* database, the raw co-citation matrices were completed by computing the diagonal value for each author. As prescribed in chapter three, the diagonal value is calculated by dividing the sum of the three largest co-citation counts for each author by two. For each co-citation analysis the results were compared, after the matrices were completed and the diagonal values were computed, to more fully understand the relationships between the authors.

Co-citation Analysis 1 (inclusion of all literature)

The top five authors with the highest co-citation counts were Salas (349), Mathieu (349), Bandura (327), Ilgen (327), and Hollingshead (299). The results of the raw co-citation matrix can be found in Appendix C, *Co-citation Counts (All-inclusive),* and the results of the correlation matrix can be found in Appendix D, *Correlation Matrix (All-inclusive).* The lowest diagonal value was received by Amazeen (4.5), whereas the highest diagonal value was received by Bandura (455). To summarize the diagonal values, Bandura was followed at the top of the list by Mathieu (424.5), Salas (414.5), Ilgen (320), and Spector (315). The complete list of the diagonal values can be found in Table 9, *Rank Order of Co-citation Intersections (All-inclusive).*

Table 9. *Rank Order of Co-citation Intersections (All-inclusive)*

Rank	Author	1	2	3	Diagonal Value
1	Bandura A	327	299	284	455
2	Mathieu J	349	263	237	424.5
3	Salas E	349	257	223	414.5
4	Ilgen DR	327	163	150	320
5	Spector PE	250	237	143	315
6	Tannenbaum SI	257	212	128	298.5
7	Kozlowski SWJ	208	186	160	277
8	Zaccaro SJ	186	173	146	252.5
9	Hollingshead AB	299	118	79	248
10	Wegner DM	284	118	78	240
11	Gully SM	185	147	135	233.5
12	Cannon-Bowers JA	210	118	93	210.5
13	Marks MA	186	122	83	195.5
14	Rouse WB	215	88	71	187
15	Hinsz VB	201	74	72	173.5
16	Kraiger K	181	85	78	172
17	Klein KJ	132	114	95	170.5
18	Vollrath DA	201	60	57	159
19	Morris NM	215	45	39	149.5
20	Heffner TS	105	99	93	148.5
21	Zedeck S	140	79	69	144
22	Goodwin GF	97	97	93	143.5
23	Klein G	121	86	79	143
24	Levine JM	115	80	79	137
25	Stout RJ	134	76	64	137
26	Bowers CA	159	61	53	136.5
27	Ryan AM	126	77	57	130
28	Prince C	126	68	61	127.5
29	Clark A	118	82	38	119
30	Hutchins E	118	66	49	116.5
31	Mohammed S	101	76	54	115.5
32	Baker DP	107	68	48	111.5
33	Klimoski RJ	83	65	59	103.5
34	Endsley MR	79	77	44	100
35	Milanovich DM	70	64	51	92.5
36	Levine EL	105	35	35	87.5
37	Rentsch JR	67	46	44	78.5
38	Bell BS	71	42	40	76.5
39	Burke CS	63	36	35	67
40	Jentsch F	60	43	29	66

Table 9 (Cont.)

Rank	Author	1	2	3	Diagonal Value
41	Kraut RE	55	41	35	65.5
42	Shapira Z	51	46	28	62.5
43	Brehmer B	44	42	38	62
44	Schooler JW	78	23	20	60.5
45	Cooke NJ	49	37	34	60
46	Oser RL	49	34	30	56.5
47	Lant TK	46	43	22	55.5
48	Dumville BC	46	32	26	52
49	Fowlkes JE	42	32	29	51.5
50	Woehr DJ	45	33	25	51.5
51	Edmondson AC	39	32	30	50.5
52	Blickensderfer E	43	29	27	49.5
53	Menon S	47	22	22	45.5
54	Volpe CE	33	32	21	43
55	Ocasio W	43	16	16	37.5
56	Goodwin B	29	22	21	36
57	Markman AB	29	22	19	35
58	Jundt D	33	16	16	32.5
59	Weaver JL	26	25	12	31.5
60	Greenberg S	22	18	17	28.5
61	Fiore SM	20	19	12	25.5
62	Converse SA	23	15	11	24.5
63	Seifert CM	19	17	13	24.5
64	Entin EE	20	14	13	23.5
65	Artman H	17	15	11	21.5
66	Gutwin C	18	12	11	20.5
67	Millward LJ	18	12	11	20.5
68	Espinosa JA	21	6	4	15.5
69	McNeese M	13	9	7	14.5
70	Langfield-Smith K	9	7	5	10.5
71	Gramopadhye AK	6	3	3	6
72	Amazeen PG	5	2	2	4.5

Co-citation Analysis 2 (1990-1995)

The top five authors with the highest co-citation counts were Salas (208), Tennenbaum (208), Mathieu (184), Kraiger (143), and Prince (99). The results of the raw

co-citation matrix can be found in Appendix E, *Co-citation Counts (1990-1995)*, and the results of the correlation matrix can be found in Appendix F, *Correlation Matrix (1990-1995)*. The lowest diagonal value was received by McNeese (6.5) and Klimoski (6.5), whereas the highest diagonal value was received by Salas (260). To summarize the diagonal values, Salas was followed at the top of the list by Tennenbaum (223.5), Mathieu (203), Kraiger (119), and Prince (88). The complete list of the diagonal values can be found in Table 10, *Rank Order of Co-citation Intersections (1990-1995)*. Three of the five authors with the highest diagonal value (Tennenbaum, Mathieu, and Kraiger) shared at least one of their top three co-citation intersections with Salas. This suggests that Salas was a significant influence during this time period.

Table 10. *Rank Order of Co-citation Intersections (1990-1995)*

Rank	Author	1	2	3	Diagonal Value
1	Salas E	208	169	143	260
2	Tannenbaum SI	208	184	55	223.5
3	Mathieu J	184	169	53	203
4	Kraiger K	143	55	40	119
5	Prince C	99	51	26	88
6	Baker DP	61	51	23	67.5
7	Kozlowski SWJ	45	31	30	53
8	Levine JM	40	27	24	45.5
9	Spector PE	53	24	14	45.5
10	Bandura A	35	28	26	44.5
11	Endsley MR	36	26	23	42.5
12	Bowers CA	40	26	18	42
13	Ilgen DR	30	26	24	40
14	Mohammed S	40	21	19	40
15	Klein G	30	25	22	38.5
16	Wegner DM	36	24	17	38.5
17	Hutchins E	30	22	22	37
18	Hollingshead AB	27	22	22	35.5
19	Klein KJ	31	21	17	34.5

Table 10 (Cont.)

Rank	Author	1	2	3	Diagonal Value
20	Rouse WB	42	12	12	33
21	Rentsch JR	23	21	21	32.5
22	Zaccaro SJ	26	20	19	32.5
23	Stout RJ	29	20	10	29.5
24	Schooler JW	36	14	8	29
25	Lant TK	28	18	9	27.5
26	Hinsz VB	24	16	14	27
27	Kraut RE	22	20	7	24.5
28	Converse SA	23	15	7	22.5
29	Brehmer B	19	13	12	22
30	Shapira Z	28	7	5	20
31	Gully SM	15	13	11	19.5
32	Ryan AM	12	11	11	17
33	Vollrath DA	24	7	3	17
34	Zedeck S	17	7	7	15.5
35	Clark A	22	4	4	15
36	Cooke NJ	17	7	6	15
37	Seifert CM	14	10	6	15
38	Ocasio W	18	7	3	14
39	Woehr DJ	16	5	5	13
40	Levine EL	8	6	6	10
41	Greenberg S	7	6	5	9
42	Markman AB	8	4	3	7.5
43	Klimoski RJ	7	4	2	6.5
44	McNeese M	6	4	3	6.5

Co-citation Analysis 3 (1996-2001)

The top five authors with the highest co-citation counts were Salas (215), Cannon-Bowers (215), Marks (177), Zaccaro (177), and Mathieu (172). The results of the raw co-citation matrix can be found in Appendix G, *Co-citation Count (1996-2001)*, and the results of the correlation matrix can be found in Appendix H, *Correlation Matrix (2002-2007)*. The lowest diagonal value was received by Shapira (2.5), whereas the highest diagonal value was received by Salas (249.5). To summarize the diagonal values,

Salas was followed at the top of the list by Cannon-Bowers (209.5), Mathieu (200.5), Marks (177), and Zaccaro (175.5). The complete list of the diagonal values can be found in Table 11, *Rank Order of Co-citation Intersections (1996-2001)*. Marks and Zaccaro received high diagonal values, but their third highest co-citation counts were significantly lower than the first two counts. In addition, Marks and Zaccaro's highest co-citation count was received as a result of an intersection with each other. Although these authors have a high diagonal value ranking, the evidence indicates that the authors do not have the influence in team cognition literature suggested by the ranking.

Table 11. *Rank Order of Co-citation Intersections (1996-2001)*

Rank	Author	1	2	3	Diagonal Value
1	Salas E	215	172	112	249.5
2	Cannon-Bowers JA	215	109	95	209.5
3	Mathieu J	172	115	114	200.5
4	Marks MA	177	114	63	177
5	Zaccaro SJ	177	115	59	175.5
6	Heffner TS	96	95	95	143
7	Goodwin GF	94	94	93	140.5
8	Gully SM	96	95	88	139.5
9	Kozlowski SWJ	103	87	68	129
10	Stout RJ	109	77	64	125
11	Bandura A	88	67	58	106.5
12	Hinsz VB	143	31	31	102.5
13	Vollrath DA	143	30	27	100
14	Bowers CA	112	42	38	96
15	Milanovich DM	68	64	52	92
16	Ilgen DR	45	45	41	65.5
17	Mohammed S	49	45	35	64.5
18	Spector PE	42	40	37	59.5
19	Klein G	65	27	15	53.5
20	Klein KJ	51	30	26	53.5
21	Jentsch F	46	38	20	52
22	Dumville BC	49	31	22	51
23	Ryan AM	48	37	16	50.5

Table 11 (Cont.)

Rank	Author	1	2	3	Diagonal Value
24	Cooke NJ	35	31	30	48
25	Blickensderfer E	42	27	26	47.5
26	Prince C	30	30	21	40.5
27	Volpe CE	32	32	17	40.5
28	Hollingshead AB	31	30	19	40
29	Oser RL	38	22	20	40
30	Kraiger K	32	23	18	36.5
31	Tannenbaum SI	36	20	16	36
32	Baker DP	38	18	15	35.5
33	Edmondson AC	23	23	19	32.5
34	Menon S	42	14	9	32.5
35	Endsley MR	27	25	11	31.5
36	Klimoski RJ	27	17	14	29
37	Rentsch JR	27	15	13	27.5
38	Levine JM	20	17	15	26
39	Levine EL	16	14	7	18.5
40	Wegner DM	19	8	7	17
41	Clark A	12	10	10	16
42	Millward LJ	9	9	6	12
43	Markman AB	10	7	5	11
44	Gutwin C	12	4	4	10
45	Langfield-Smith K	8	6	6	10
46	Kraut RE	8	7	4	9.5
47	Greenberg S	12	3	2	8.5
48	Schooler JW	6	5	3	7
49	Hutchins E	9	2	2	6.5
50	Woehr DJ	7	4	2	6.5
51	Ocasio W	6	3	3	6
52	Lant TK	3	2	2	3.5
53	Seifert CM	3	2	2	3.5
54	Shapira Z	2	2	1	2.5

Co-citation Analysis 4 (2002-2007)

The top five authors with the highest co-citation counts were Kozlowski (72), Bell (72), Ilgen (36), Jundt (36), and Burke (35). The results of the raw co-citation matrix can

be found in Appendix I, *Co-citation Count (2002-2007)*, and the results of the correlation matrix can be found in Appendix J, *Correlation Matrix (2002-2007)*. The lowest diagonal value was received by Klein (2.5), whereas the highest diagonal value was received by Kozlowski (57.5). To summarize the diagonal values, Kozlowski was followed at the top of the list by Bell (47), Burke (45.5), Ilgen (39.5), and Salas (36). The complete list of the diagonal values can be found in Table 12, *Rank Order of Co-citation Intersections (2002-2007)*. Since this time period is the most recent and the authors' works have had little time to be referenced, the citation counts and co-citation counts were much lower than the previous two time periods. As a result, one large co-citation intersection can significantly influence the diagonal values. For instance, Bell's high co-citation intersection with Kozlowski accounted for his high placement on the diagonal value ranking because his other co-citation values were significantly lower than many of the authors in the top 10.

Table 12. *Rank Order of Co-citation Intersections (2002-2007)*

Rank	Author	1	2	3	Diagonal Value
1	Kozlowski SWJ	72	24	19	57.5
2	Bell BS	72	12	10	47
3	Burke CS	35	29	27	45.5
4	Ilgen DR	36	24	19	39.5
5	Salas E	35	19	18	36
6	Zaccaro SJ	29	25	16	35
7	Marks MA	27	25	11	31.5
8	Jundt D	36	11	10	28.5
9	Mathieu J	19	18	16	26.5
10	Gully SM	15	14	12	20.5
11	Mohammed S	18	9	8	17.5
12	Bandura A	15	6	4	12.5
13	Edmondson AC	9	6	4	9.5
14	Klein KJ	8	5	4	8.5
15	Spector PE	8	3	2	6.5
16	Hollingshead AB	4	4	4	6
17	Ryan AM	8	2	2	6
18	Kraut RE	3	3	1	3.5
19	Levine JM	4	1	1	3
20	Klein G	3	1	1	2.5

To more fully understand the relationships among the identified authors, it was necessary to proceed to the next step in the methodology. It must first be noted that the single citation counts completed in the first search are not a good indication of an author's influence in team cognition. Regardless of the discipline, the *SSCI* database simply reports the number of times an author has been referenced. In some cases, the counts reported in citation tables could be much higher than the actual number of times the particular author has been referenced. For instance, when the author, "Clark A," is entered into the database, it shows that he has a total of 7,296 citation counts. Since Clark's middle initial is unknown, the total count reported by the database includes every

person with the last name "Clark" and the first initial "A." Thus, to receive the most accurate results, the user needs to have as much information (i.e. his middle initial) as possible. This is a severe limitation of the *SSCI* database because it can provide misleading data. The subsequent co-citation search was meant to provide more focus and as a result, significantly lower the error incurred from the initial citation search.

The information gathered from these co-citation analyses will be directly applicable to answering the following three research questions:

1) What authors and literature have significantly impacted team cognition research?
2) What are the different areas of research found in team cognition?
3) How has team cognition research evolved throughout its lifetime?

The first co-citation analysis will identify the important authors and the different areas of research when all of the literature in the *SSCI* database is included. On the other hand, the three time period co-citation analyses will identify those authors and research areas that were instrumental in establishing the foundation for team cognition literature. In addition, the co-citation analyses will identify the emerging authors and research areas found in team cognition literature.

Multivariate Analyses

The purpose of this section is to provide the framework to answer the second and third research questions. By using the author citation and co-citation information gathered in the previous section, a factor analysis was conducted to classify groups of identified authors into separate areas of research found within team cognition. In addition, MDS map were created to provide a visual display of the relationships between the authors and their respective area of research.

Factor Analysis

To begin the completion of the factor analysis, the data from each raw co-citation matrix was entered into the *SPSS* software. The preferences discussed in chapter three's factor analysis section were entered into *SPSS* before executing the program. More specifically, the principal component method was used to analyze the correlation matrix and extract eigenvalues over one. In addition, the varimax technique was selected as the rotation method of choice and factors with values below 0.4 were suppressed for ease of interpretation (Field, 2005, p. 647).

In order to accomplish the analysis below, the procedures identified in the "factor analysis" section of chapter three were followed. Once a legitimate number of factors were determined for each co-citation analysis, the next step was to properly name and distinctly classify each factor. As previously stated, a small sample of papers that cited the authors possessing the highest factor loadings together were reviewed to reduce the subjectivity of assigning a title to each factor. Additional searches were performed using the *SSCI* database to locate these publications. Once located, the publications were gathered, organized, and reviewed in the online *RefWorks* software. In order to develop a sufficient name that embodied the general idea of each factor, the titles and abstracts were considered. More specifically, the title assigned to each factor was assigned based on the topics that consistently appeared in the literature. A representative theme for the factors in each of the four co-citation analyses was appropriately selected given time and scoping constraints associated with this thesis. It is important to note that in some cases a discernable theme was not able to be determined. As a result, the title assigned to these factors was "Untitled."

Co-citation Analysis 1 (inclusion of all literature)

After the extraction was conducted, the analysis indicated that 14 factors best represented the data. These 14 factors also accounted for 81.32 % of the total variance (Field, 2005, p. 652). In accordance with the majority of factor analyses, most of the total variance was encapsulated in the first few factors (Field, 2005, p. 652). After careful consideration of each factor, the total number of factors was reduced to six, accounting for 63.03% of the variance. Once again, the factor analysis was top heavy, meaning that a majority of the variance was found in the first few factors. Fifty of the authors loaded onto just one factor, twenty authors loaded onto two factors, and two authors loaded onto three factors. The high rate of authors loading onto more than one factor (30.6%) suggests that many of the authors have various research interests and are also influential in multiple research areas. A summary of the author breakdown for each factor is as follows: twenty-nine authors loaded onto factor one, twenty-three authors loaded onto factor two, fifteen authors loaded onto factor three, twelve authors loaded onto factor four, nine authors loaded onto factor five, four authors loaded onto factor six, and two authors did not load onto a factor. The factor analysis output can be viewed in Table 13, *Factor Analysis Loadings (All-inclusive)*.

Table 13. *Factor Analysis Author Loadings (All-inclusive)*

Factor 1		**Factor 2 (Cont.)**		**Factor 3 (Cont.)**	
Author	**Loading**	**Author**	**Loading**	**Author**	**Loading**
Mohammed S	0.869	Jentsch F	0.821	Tannenbaum SI	0.426
Heffner TS	0.807	Oser RL	0.802	**Factor 4**	
Goodwin GF	0.804	Stout RJ	0.801	**Author**	**Loading**
Zaccaro SJ	0.759	Blickensderfer E	0.666	Wegner DM	0.786
Marks MA	0.754	Endsley MR	0.659	Clark A	0.729
Dumville BC	0.729	Volpe CE	0.656	Markman AB	0.721
Rentsch JR	0.722	Entin EE	0.650	Hutchins E	0.709
Edmondson AC	0.711	Milanovich DM	0.620	Kraut RE	0.707
Cannon-Bowers JA	0.700	Salas E	0.612	Schooler JW	0.688
Mathieu J	0.678	Artman H	0.599	Hollingshead AB	0.674
Kozlowski SWJ	0.674	Cannon-Bowers JA	0.538	Greenberg S	0.648
Burke CS	0.659	Burke CS	0.530	Levine JM	0.558
Jundt D	0.615	Weaver JL	0.501	Seifert CM	0.511
Salas E	0.603	Converse SA	0.501	Bandura A	0.491
Levine JM	0.576	Cooke NJ	0.488	Amazeen PG	0.470
Klein KJ	0.572	Klein G	0.482	**Factor 5**	
Gully SM	0.558	Kraiger K	0.481	**Author**	**Loading**
Bell BS	0.545	Tannenbaum SI	0.462	Rouse WB	0.853
Millward LJ	0.524	Fiore SM	0.450	Morris NM	0.796
Milanovich DM	0.522	**Factor 3**		Gramopadhye AK	0.697
Langfield-Smith K	0.473	**Author**	**Loading**	Klein G	0.652
Blickensderfer E	0.470	Spector PE	0.879	Brehmer B	0.582
Entin EE	0.445	Levine EL	0.799	Endsley MR	0.562
Ilgen DR	0.441	Ryan AM	0.789	Cooke NJ	0.499
Kraiger K	0.439	Zedeck S	0.784	Converse SA	0.490
Bandura A	0.433	Ilgen DR	0.766	McNeese M	0.489
Stout RJ	0.430	Woehr DJ	0.660	**Factor 6**	
Klimoski RJ	0.429	Klimoski RJ	0.660	**Author**	**Loading**
Hinsz VB	0.423	Bandura A	0.636	Lant TK	0.775
Factor 2		Menon S	0.632	Ocasio W	0.715
Author	**Loading**	Mathieu J	0.584	Shapira Z	0.767
Prince C	0.931	Kozlowski SWJ	0.575	Goodwin B	-0.444
Bowers CA	0.841	Klein KJ	0.544	**Not Loaded onto a Factor**	
Baker DP	0.831	Gully SM	0.490	Vollrath DA	
Fowlkes JE	0.822	Kraiger K	0.440	Espinosa A	

Factor 1: Team Mental Models

Although 25 articles were found that cited the five authors with the five highest factor loadings together, only the first 10 articles were reviewed. A list of these articles is found in Table 14, *Factor 1 (All-inclusive): Articles Reviewed*. Some of the topics that consistently appeared throughout the articles included: group member collaboration, team decision making and communication, shared mental models, individual and team performance, team knowledge, information processing and conflict in teams, team mental models, and mental models in team performance. The two main themes were team performance and team mental models. Team performance was discussed in nearly every article; however, the articles were more interested in gaining an understanding and learning about the team mental models that impacted team performance. As a result, an appropriate name for factor one is TEAM MENTAL MODELS.

Factor 2: Team Performance

For factor two, six documents were reviewed that cited the five authors with the five highest factor loadings together and four documents were reviewed that cited the four authors with the four highest factor loadings together. A list of these articles is found in Table 15, *Factor 2 (All-inclusive): Articles Reviewed*. The major concepts of the articles were extracted and are as follows: team training effectiveness, team performance, the result of training on team performance, enhancing team cognition, leadership as an outcome of team processes, impact of work group teamwork on team performance, team decision making under times stress, situation awareness, and task performance. The main topics of these papers were team training, teamwork, and team decision making. Despite this, the articles were primarily interested in increasing the

performance of a team through the analysis of the previous topics and concepts. Consequently, an appropriate name for factor two is TEAM PERFORMANCE.

Table 14. *Factor 1 (All-inclusive): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Considering diversity: Multivoicedness in international academic collaboration (5)
2	When does the medium matter? Knowledge-building experiences and opportunities in decision-making teams (5)
3	Differentiating knowledge in teams: The effect of shared declarative and procedural knowledge on team performance (5)
4	A multilevel examination of the relationships among training outcomes, mediating regulatory processes, and adaptive performance (5)
5	Measuring team knowledge: A window to the cognitive underpinnings of team performance (5)
6	Representational gaps, information processing, and conflict in functionally diverse teams (5)
7	Antecedents and consequences of the service climate in boundary-spanning self-managing service teams (5)
8	Relationships among team ability composition, team mental models, and team performance (5)
9	System breakdown: The role of mental models and transactive memory in the relationship between acute stress and team performance (5)
10	Becoming team players: Team members' mastery of teamwork knowledge as a predictor of team task proficiency and observed teamwork effectiveness (5)

Table 15. *Factor 2 (All-inclusive): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Can PC-based systems enhance teamwork in the cockpit? (5)
2	Team training in the skies: Does crew resource management (CRM) training work? (5)
3	The science of training: A decade of progress (5)
4	A methodology for enhancing crew resource management training (5)
5	The design and delivery of crew resource management training: Exploiting available resources (5)
6	Markers for enhancing team cognition in complex environments: The power of team performance diagnosis (5)
7	Leadership capacity in teams (4)
8	An intervention to enhance nursing staff teamwork and engagement (4)
9	On the utility of experiential cross-training for team decisionmaking under time stress (4)
10	Considerations for training team situation awareness and task performance through PC-gamer simulated multiship helicopter operations (4)

Factor 3: The Effect of Cognitive Ability on Job Performance

In the analysis of factor three, 12 articles were identified that cited the four authors with the four highest factor loadings together, but to be consistent with the methodology, 10 were reviewed. A list of these articles appears in Table 16, *Factor 3 (All-inclusive): Articles Reviewed*. Many of the concepts discussed in the articles focused on the individual and were as follows: cognitive ability as a predictor of job performance, organizational justice, personnel selection, general mental ability, intelligence tests as a predictor for training success, personality tests, and the contribution of self efficacy to work-related performance. In addition, the documents sought to analyze the relationship between an individual's behavior and its effect on the organization. More specifically, the articles were attempting to discover how a person's cognitive ability (i.e. personality, intelligence, etc.) impacts job performance. After considering this information, factor three is named THE EFFECT OF COGNITIVE ABILITY ON JOB PERFORMANCE.

Factor 4: Untitled

Twenty-seven articles were identified as candidates to review for factor four. Among these papers, two were reviewed that cited the three authors with the three highest factor loadings together and eight were reviewed that cited the two authors with the two highest factor loadings together. A list of these articles appears in Table 17, *Factor 4 (All-inclusive): Articles Reviewed*. Some of the main topics discussed in the documents included: how knowledge representations affect decision making, the evolution of primate social cognition, moral judgment theory, coping with envy, neuroscience and consciousness, inner speech, supramodular interaction theory, and self organization and cognitive performance. Although these articles mainly discussed some

sort of individual cognition, a clear, discernable theme was not evident. This was most likely a result of the low number of documents that cited several of the authors with high factor loadings together. Upon consideration of this, factor four will not be named and designated as UNTITLED.

Table 16. *Factor 3 (All-inclusive): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	The predictive validity of cognitive ability tests: A UK meta-analysis (4)
2	Vocational Behavior 1990-1992 - Personnel Practices, Organizational-Behavior, Workplace Justice, and Industrial Organizational Measurement Issues (4)
3	The role of justice in organizations: A meta-analysis (4)
4	Personnel selection: Looking toward the future - Remembering the past (4)
5	Validity of general mental ability for the prediction of job performance and training success in Germany: A meta-analysis (4)
6	Comparing criterion-related validities of different intelligence tests for the prediction of training success in Germany: A meta-analysis (4)
7	Self-efficacy and work-related performance: The integral role of individual differences (4)
8	Reconsidering the use of personality tests in personnel selection contexts (4)
9	Role of social desirability in personality testing for personnel selection: The red herring (4)
10	Cognitive and GMA testing in the European community: Issues and evidence (4)

Table 17. *Factor 4 (All-inclusive): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	The function of phenomenal states: Supramodular interaction theory (3)
2	Self-organization of cognitive performance (3)
3	The social nature of primate cognition (2)
4	Knowledge representations and knowledge transfer (2)
5	The emotional dog and its rational tail: A social intuitionist approach to moral judgment (2)
6	Student nurses' experiences and perceptions of envy in one nurse education environment in Finland (2)
7	Can neuroscience explain consciousness? (2)
8	Thought as action: Inner speech, self-monitoring, and auditory verbal hallucinations (2)
9	Emergence of self and other in perception and action: An event-control approach (2)
10	The role of control in a science of consciousness - Causality, regulation and self-sustainment (2)

Factor 5: Untitled

The articles that loaded onto factor five dealt with the following subjects: effect of allocation of functions on long-term performance, measurement of trust over time, effect of trust on performance, troubleshooting performance, barriers women face in the information technology work force, mindshift learning to ease worker learning process, and information system development. Only three articles were found that cited the three highest authors with the three highest factor loadings together. As a result, 209 articles were found that cited the two highest authors with the two highest factor loadings together. Seven of these articles were pulled in addition to the three mentioned above. A list of these articles appears in Table 18, *Factor 5 (All-inclusive): Articles Reviewed*. Although a common theme could be identified in this sample of documents, it would not accurately represent the factor for two reasons. First, a clear theme could not be discerned from the three articles that cited the three highest authors with the three highest factor loadings together. If a theme could not be found in these articles, then it would be even more difficult to detect a theme when only the first two authors are used to identify articles. Second, too many topics were discussed in the second group of articles to select an exclusive theme. Like factor four, factor five will not be named and will be designated as UNTITLED.

Factor 6: Organizational Performance

The ideas presented by the articles on factor six were surprisingly similar and included topics such as organizational performance, organizational learning and adaptation, cognitive spatial boundaries of organizations, organizational learning theory, organizational decision making, and organizational change. Ten articles that cited the

three authors with the three highest factor loadings together were reviewed. A list of these articles appears in Table 19, *Factor 6 (All-inclusive): Articles Reviewed*. The purpose of each article was to analyze an organization and determine what concepts could be applied in the future to improve its performance. As a result, the name given to this factor will be ORGANIZATIONAL PERFORMANCE.

Table 18. *Factor 5 (All-inclusive): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	The effects of allocation of functions on the long-term performance of manufacturing cells - A case study (3)
2	Measurement of human trust in a hybrid inspection system based on signal detection theory measures (3)
3	Measurement of trust over time in hybrid inspection systems (3)
4	Cognitive Ergonomics - Contributions from Experimental-Psychology - Vanderveer,gc, Bagnara,s, Kempen,gam (2)
5	The effects of network size and fault intermmittency on troubleshooting performance (2)
6	Making sense of the barriers women face in the information technology work force: Standpoint theory, self-disclosure, and causal maps (2)
7	Three-process model of supervisory activity over 24 hours (2)
8	Understanding mindshift learning: The transition to object-oriented development (2)
9	A feedback model to understand information system usage (2)
10	Differentiating knowledge in teams: The effect of shared declarative and procedural knowledge on team performance (2)

Table 19. *Factor 6 (All-inclusive): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Less likely to fail: Low performance, firm size, and factory expansion in the shipbuilding industry (3)
2	Aspiration performance and railroads' patterns of learning from train wrecks and crashes (3)
3	Hits and misses: Managers' (mis)categorization of competitors in the Manhattan hotel industry (3)
4	Dancing with strangers: aspiration performance and the search for underwriting syndicate partners (3)
5	Organizational actions in response to threats and opportunities (3)
6	Situational and institutional determinants of firms' R&D search intensity (3)
7	It's all in the name: Failure-induced learning by multiunit chains (3)
8	A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding (3)
9	Sticky aspirations: Organizational time perspective and competitiveness (3)
10	Performance, aspirations, and risky organizational change (3)

Co-citation Analysis 2 (1990-1995)

After the extraction was conducted for the 1990-1995 time period, the analysis indicated that 11 factors best represented the data. These 11 factors also accounted for 83.91 % of the total variance (Field, 2005, p. 652). In accordance with the majority of factor analyses, most of the total variance was encapsulated in the first few factors (Field, 2005, p. 652). The first three factors encompassed 47.25% of the variance. After careful consideration of each factor, the total number of factors was reduced to six, accounting for 65.33% of the variance. Once again, the factor analysis was top heavy, meaning that a majority of the variance was found in the first few factors. Thirty-five of the authors loaded onto one factor, and nine authors loaded onto two factors. A summary of the author breakdown for each factor is as follows: fourteen authors loaded onto factor one, sixteen authors loaded onto factor two, seven authors loaded onto factor three, seven authors loaded onto factor four, four authors loaded onto factor five, three authors loaded onto factor six, and two authors did not load onto a factor. The factor analysis output for the 1990-1995 time period can be viewed in Table 20, *Factor Analysis Loadings (1990-1995)*.

Table 20. *Factor Analysis Author Loadings (1990-1995)*

Factor 1		**Factor 3**	
Author	**Loading**	**Author**	**Loading**
Prince C	0.851	Klein G	0.879
Salas E	0.825	Brehmer B	0.736
Bowers CA	0.805	Hutchins E	0.720
Stout RJ	0.805	McNeese M	0.687
Kraiger K	0.740	Cooke NJ	0.677
Baker DP	0.717	Endsley MR	0.621
Converse SA	0.692	Rouse WB	0.445
Tennenbaum SI	0.665	**Factor 4**	
Rouse WB	0.628	**Author**	**Loading**
Endsley MR	0.582	Hollingshead AB	0.887
Levine EL	0.563	Levine JM	0.770
Mohammed S	0.552	Hinsz VB	0.750
Mathieu J	0.540	Kraut RE	0.607
Rentsch JR	0.417	Vollrath DA	0.553
Factor 2		Mohammed S	0.486
Author		Hutchins E	0.489
Ilgen DR	0.867	**Factor 5**	
Kozlowski SWJ	0.820	**Author**	**Loading**
Spector PE	0.784	Schooler JW	0.896
Ryan AM	0.784	Wegner DM	0.844
Klein KJ	0.698	Seifert CM	0.780
Mathieu J	0.697	Markman AB	0.669
Bandura A	0.628	**Factor 6**	
Zedeck S	0.625	**Author**	**Loading**
Zaccaro SJ	0.614	Lant TK	0.896
Gully SM	0.555	Shapira Z	0.844
Tennenbaum SI	0.545	Ocasio W	0.780
Rentsch JR	0.519	**Not Loaded**	
Klimoski RJ	0.487	Clark A	
Woehr DJ	0.465	Greenberg S	
Salas E	0.429		
Levine EL	0.407		

Factor 1: Team Performance

Nine articles were found and reviewed that cited the five authors with the five highest factor loadings together. A list of these articles is found in Table 21, *Factor 1 (1990-1995): Articles Reviewed.* Some of the topics that consistently appeared throughout the articles included: teamwork behavior in team performance, team-interaction training, team effectiveness, importance of teams to organizational effectiveness, aircrew coordination, team adaptation, and mental models. After reading the abstracts and the titles of the articles, it was rather clear that team performance was the primary subject matter of interest. With this in mind, factor one will be classified as TEAM PERFORMANCE.

Factor 2: The Effect of Individuals and Teams on Job Performance

For factor two, two documents were reviewed that cited the four authors with the four highest factor loadings together and eight documents were reviewed that cited the three authors with the three highest factor loadings together. A list of these articles is found in Table 22, *Factor 2 (1990-1995): Articles Reviewed.* The major concepts of the articles were extracted and are as follows: job analysis using social and cognitive sources, newcomer performance in work teams, group process variables, work characteristics, the effect of empowerment on job performance, and work-life conflict. Essentially the subjects discussed in the articles centered on how job performance was impacted through teams and individuals. Consequently, an appropriate name for factor two is THE EFFECT OF INDIVIDUALS AND TEAMS ON JOB PERFORMANCE.

Table 21. *Factor 1 (1990-1995): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Analyzing team performance: In the eye of the beholder? (4)
2	How to turn a team of experts into an expert medical team: guidance from the aviation and military communities (5)
3	Origins of coordination and team effectiveness: A perspective from game theory and nonlinear dynamics (4)
4	Teams in organizations: Recent research on performance and effectiveness (4)
5	Evidence for the validity of PC-based simulations in studying aircrew coordination (4)
6	Performance implications of leader briefings and team-interaction training for team adaptation to novel environments (5)
7	Teamwork in multi-person systems: a review and analysis (4)
8	Military Team Research - 10 Years of Progress (5)
9	Networked Simulations - New Paradigms for Team Performance Research (4)

Table 22. *Factor 2 (1990-1995): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Vocational Behavior 1990-1992 - Personnel Practices, Organizational-Behavior, Workplace Justice, and Industrial Organizational Measurement Issues (4)
2	Social and cognitive sources of potential inaccuracy in job analysis (4)
3	The impact of expectations on newcomer performance in teams as mediated by work characteristics, social exchanges, and empowerment (3)
4	The relationship of group process variables and team performance - A team-level analysis in a field setting (3)
5	Work characteristics and well-being of Swiss apprentices entering the labor market (3)
6	The restriction of variance hypothesis and interrater reliability and agreement: Are ratings from multiple sources really dissimilar? (3)
7	An examination of the mediating role of psychological empowerment on the relations between the job, interpersonal relationships, and work outcomes (3)
8	Assessor training strategies and their effects on accuracy, interrater reliability, and discriminant validity (3)
9	Managing work-life conflict among information technology workers (3)
10	Matching motivational strategies with organizational contexts (3)

Factor 3: Individual and Team Decision Making

In the analysis of factor three, one article was identified that cited the three authors with the three highest factor loadings together and 18 articles were found that cited the two authors with the two highest factor loadings together. To be consistent with the methodology, 10 of the articles were reviewed. A list of these articles appears in Table 23, *Factor 3 (1990-1995): Articles Reviewed.* Many of the concepts discussed in the articles focused on decision making and were as follows: role of time in decision making, individual judgment performance, telephone counseling decision process, naturalistic decision making research, representative design and decision making research, student performance in a decision making task. Most of the reviewed documents specifically analyzed the decision making ability of individuals; however, a few of the papers sought to specifically examine team decision making. After considering all of this information, factor three will be named INDIVIDUAL AND TEAM DECISION MAKING.

Factor 4: The Impact of Team Mental Models on Team Performance

Twenty-seven articles were identified as candidates to review for factor four. Among these papers, four were reviewed that cited the three authors with the three highest factor loadings together and six were reviewed that cited the two authors with the two highest factor loadings together. A list of these articles appears in Table 24, *Factor 4 (1990-1995): Articles Reviewed.* Some of the main topics discussed in the documents included: the impact of diversity on group performance, diverse aspects of membership dynamics, virtual teams, collective induction, technological mediation and team performance, groups as information processors, and group cognition and decision

making. Some of the articles attempted to figure out an optimum team member arrangement to improve team performance. Other articles analyzed the interactions between the team members and tried to discover the best way to facilitate their relationship to improve team performance. In other words, the authors of these articles were essentially trying to discover the most efficient way to manipulate a certain aspect of a team's mental model to foster effective team performance. Upon consideration of this, factor four will be designated THE IMPACT OF TEAM MENTAL MODELS ON TEAM PERFORMANCE.

Table 23. *Factor 3 (1990-1995): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	The role of representative design in an ecological approach to cognition (3)
2	A timely account of the role of duration in decision making (2)
3	Modeling and analysis of a dynamic judgment task using a lens model approach (2)
4	The telephone counseling interview as a complex, dynamic, decision process: A self-regulation model of counselor effectiveness (2)
5	Establishing the boundaries of a paradigm for decision-making research (2)
6	Effects of concurrent verbalization on a time-critical, dynamic decision-making task (2)
7	Dynamics of communication in emergency management (2)
8	Feedback delays: How can decision makers learn not to buy a new car every time the garage is empty? (2)
9	Learning in dynamic decision tasks: Computational model and empirical evidence (2)
10	Instance-based learning in dynamic decision making (2)

Table 24. *Factor 4 (1990-1995): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	The emerging conceptualization of groups as information processors (3)
2	Group performance and decision making (3)
3	Team mental model - Construct or metaphor (3)
4	A theory of collective induction (3)
5	Effects of racial diversity on complex thinking in college students (2)
6	Membership matters - how member change and continuity affect small-group structure, process, and performance (2)
7	A typology of virtual teams - Implications for effective leadership (2)
8	Effects of individual versus mixed individual and group experience in rule induction on group member learning and group performance (2)
9	Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality (2)
10	Virtual teams: Effects of technological mediation on team performance (2)

Factor 5: Individual Cognition

The articles that loaded onto factor five dealt with the following subjects: social behavior, memory, individual behavior and decision making, social cognition, self-evaluation and attitude, and moral judgment. Thirty-six articles were found that cited the two highest authors with the two highest factor loadings together and 10 of these were examined to determine a factor theme. A list of these articles appears in Table 25, *Factor 5 (1990-1995): Articles Reviewed*. In general, the topics discussed in the reviewed articles centered on mental characteristics of the individual. In other words, the papers attempted to advance the knowledge of what and how the cognitive processes of an individual are affected. As a result, it is appropriate to assign factor five with the name INDIVIDUAL COGNITION.

Factor 6: Organizational Performance

The ideas presented by the articles on factor six were similar and included topics such as organizational performance, organizational learning and adaptation, cognitive spatial boundaries of organizations, organizational decision making, organizational risk, and organizational change. Five articles that cited the three authors with the three highest factor loadings together and five articles that cited the two authors with the two highest factor loadings together were reviewed. Many of the articles were the same as those that appeared in factor six of the co-citation analysis that included all literature. A list of these articles appears in Table 26, *Factor 6 (1990-1995): Articles Reviewed*. The purpose of each article was to analyze an organization and determine what concepts could be applied in the future to improve its performance. As a result, the name given to this factor will be ORGANIZATIONAL PERFORMANCE.

Table 25. *Factor 5 (1990-1995): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Toward a histology of social behavior: Judgmental accuracy from thin slices of the behavioral stream (2)
2	Individual differences in working memory capacity and dual-process theories of the mind (2)
3	Effects of sleep loss on confidence-accuracy relationships for reasoning and eyewitness memory (2)
4	The construction of autobiographical memories in the self-memory system (2)
5	Individual differences in eyewitness memory and suggestibility: examining relations between acquiescence, dissociation and resistance to misleading information (2)
6	Decision structuring with phantom alternatives (2)
7	Social cognition and social-perception (2)
8	Are "implicit" attitudes unconscious? (2)
9	False and recovered memories in the laboratory and clinic: A review of experimental and clinical evidence (2)
10	The emotional dog and its rational tail: A social intuitionist approach to moral judgment (2)

Table 26. *Factor 6 (1990-1995): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Less likely to fail: Low performance, firm size, and factory expansion in the shipbuilding industry (3)
2	Aspiration performance and railroads ' patterns of learning from train wrecks and crashes (3)
3	Dancing with strangers: aspiration performance and the search for underwriting syndicate partners (3)
4	Sticky aspirations: Organizational time perspective and competitiveness (3)
5	Performance, aspirations, and risky organizational change (3)
6	Hits and misses: Managers' (mis)categorization of competitors in the Manhattan hotel industry (2)
7	Situational and institutional determinants of firms' R&D search intensity (2)
8	It's all in the name: Failure-induced learning by multiunit chains (2)
9	Cognitive biases and strategic decision processes: An integrative perspective (2)
10	Comparing alternative explanations for accounting risk-return relations (2)

Co-citation Analysis 3 (1996-2001)

After the extraction was conducted for the 1996-2001 time period, the analysis indicated that 12 factors best represented the data. These 12 factors also accounted for 82.83 % of the total variance (Field, 2005, p. 652). In accordance with the majority of factor analyses, most of the total variance was encapsulated in the first few factors (Field, 2005, p. 652). The first three factors encompassed 49.42% of the variance. After careful consideration of each factor, the total number of factors was reduced to five, accounting for 61.20% of the variance. Once again, the factor analysis was top heavy, meaning that a majority of the variance was found in the first few factors. Thirty-five of the authors loaded onto one factor, thirteen authors loaded onto two factors, and one author loaded onto three factors. A summary of the author breakdown for each factor is as follows: twenty-three authors loaded onto factor one, eighteen authors loaded onto factor two, six authors loaded onto factor three, eleven authors loaded onto factor four, four authors loaded onto factor five, and four authors did not load onto a factor. The factor analysis output for the 1996-2001 time period can be viewed in Table 27, *Factor Analysis Loadings (1996-2001)*.

Table 27. *Factor Analysis Author Loadings (1996-2001)*

Factor 1		Factor 2		
Author	**Loading**	**Author**	**Loading**	**Not Loaded**
Heffner TS	0.826	Blickensderfer E	0.674	Gutwin C
Goodwin GF	0.817	Volpe CE	0.639	Greenberg S
Mathieu J	0.814	Milanovich DM	0.591	Gully SM
Mohammed S	0.775	Kraiger K	0.580	Ocasio W
Marks MA	0.765	Cannon-Bowers JA	0.577	
Zaccaro SJ	0.761	Langfield-Smith K	0.517	
Cannon-Bowers JA	0.717	Cooke NJ	0.484	
Dumville BC	0.713	Shapira Z	0.404	
Klimoski RJ	0.668	**Factor 3**		
Salas E	0.645	**Author**	**Loading**	
Rentsch JR	0.630	Spector PE	0.841	
Millward LJ	0.620	Ryan AM	0.829	
Milanovich DM	0.597	Menon S	0.788	
Cooke NJ	0.586	Levine EL	0.722	
Kraiger K	0.577	Woehr DJ	0.678	
Kozlowski SWJ	0.570	Bandura A	0.519	
Ilgen DR	0.567	**Factor 4**		
Stout RJ	0.560	**Author**	**Loading**	
Edmondson AC	0.505	Levine JM	0.724	
Langfield-Smith K	0.487	Hinsz VB	0.649	
Blickensderfer E	0.483	Edmondson AC	0.646	
Hollingshead AB	0.462	Vollrath DA	0.634	
Klein KJ	0.429	Hollingshead AB	0.615	
Factor 2		Klein KJ	0.592	
Author	**Loading**	Ilgen DR	0.520	
Bowers CA	0.851	Lant TK	0.485	
Oser RL	0.831	Kraut RE	0.472	
Jentsch F	0.783	Bandura A	0.409	
Klein G	0.780	Kozlowski SWJ	0.407	
Baker DP	0.773	**Factor 5**		
Endsley MR	0.754	**Author**	**Loading**	
Prince C	0.746	Markman AB	0.834	
Tennenbaum SI	0.740	Wegner DM	0.756	
Stout RJ	0.716	Clark A	0.669	
Salas E	0.681	Bandura A	0.484	

Factor 1: Team Processes and Performance

Although 15 articles were found that cited the five authors with the five highest factor loadings together, the first 10 articles were reviewed. A list of these articles is found in Table 28, *Factor 1 (1996-2001): Articles Reviewed.* Some of the topics that consistently appeared throughout the articles included: the effect of sharing mental models and procedural knowledge on team process and performance, the effect of teamwork on team performance, teamwork effectiveness, tem functioning, strategic consensus, and transactive memory in teams. Although the documents were primarily focused on improving team performance, they also were interested in the interactions that occur within a team. These interactions include shared mental models, team knowledge, consensus among the team member, and transactive team memory. As a result, an appropriate name for factor one is TEAM PROCESSES AND PERFORMANCE.

Factor 2: Teams in Organizations

For factor two, one document was reviewed that cited the four authors with the four highest factor loadings together and nine documents were reviewed that cited the three authors with the three highest factor loadings together. A list of these articles is found in Table 30, *Factor 2 (1996-2001): Articles Reviewed.* The major concepts of the articles were extracted and are as follows: healthcare teams, team cognition in operational and training contexts, aviation training, impact of teams on Crew Resource Management (CRM) training, and training high reliability teams to achieve organizational outcomes. The main topics of these papers were team training and shared mental models. For the most part, the environmental context of these topics took place in the medical or aviation communities. Each article was attempting to discover how a team could be most

efficiently used to increase the effectiveness of an organization. Thus, factor two is named TEAMS IN ORGANIZATIONS.

Table 28. *Factor 1 (1996-2001): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Differentiating knowledge in teams: The effect of shared declarative and procedural knowledge on team performance (5)
2	Measuring team knowledge: A window to the cognitive underpinnings of team performance (5)
3	Relationships among team ability composition, team mental models, and team performance (5)
4	System breakdown: The role of mental models and transactive memory in the relationship between acute stress and team performance (5)
5	Becoming team players: Team members' mastery of teamwork knowledge as a predictor of team task proficiency and observed teamwork effectiveness (5)
6	Bridging the gap between I (5)
7	Teams in organizations: From input-process-output models to IMOI models (5)
8	The lack of consensus about strategic consensus: Advancing theory and research (5)
9	Enhancing the effectiveness of work groups and teams (5)
10	Measuring transactive memory systems in the field: Scale development and validation (5)

Table 29. *Factor 2 (1996-2001): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Markers for enhancing team cognition in complex environments: The power of team performance diagnosis (4)
2	How to turn a team of experts into an expert medical team: guidance from the aviation and military communities (3)
3	It is not how much you have but how you use it: Toward a rational use of simulation to support aviation training (3)
4	Team training in the skies: Does crew resource management (CRM) training work? (3)
5	The science of training: A decade of progress (3)
6	Testing three team training strategies in intact teams - A meta-analysis (3)
7	A methodology for enhancing crew resource management training (3)
8	The design and delivery of crew resource management training: Exploiting available resources (3)
9	Predictors of threat and error management: Identification of core nontechnical skills and implications for training systems design (3)
10	Promoting health care safety through training high reliability teams (3)

Factor 3: The Effect of Cognitive Ability on Job Performance

In the analysis of factor three, seven articles were identified that cited the four authors with the four highest factor loadings together and two articles were identified that cited the three authors with the three highest factor loadings together. A list of these articles appears in Table 30, *Factor 3 (1996-2001): Articles Reviewed*. Some of the topics discussed in the articles were as follows: the effect of cognitive ability on job performance and training success, personnel selection, analysis of job stress in China and the U.S., and the effect of personality on job performance. The purpose of the majority of these documents was to investigate the relationship between an employee's cognitive ability and his or her job performance. This was accomplished by analyzing the previously mentioned topics such as personality, cognitive ability, and personnel selection. After considering all of this information, factor three will be named THE EFFECT OF COGNITIVE ABILITY ON JOB PERFORMANCE.

Factor 4: Shared Cognition in Teams

Twenty articles were identified as candidates to review for factor four. Among these papers, three were reviewed that cited the four authors with the four highest factor loadings together and seven were reviewed that cited the two authors with the two highest factor loadings together. A list of these articles appears in Table 31, *Factor 4 (1996-2001): Articles Reviewed*. Some of the main topics discussed in the documents included: mood as a collective property of work groups, shared cognition in organizational work groups, the impact of membership change on group creativity, analysis of group processes, and shared division of cognitive labor in groups. Like the first two factors, the main subject of these papers was teams. The topic that distinguished factor four from the

previous factors is shared cognition. A majority of the articles specifically analyzed or indirectly alluded to the properties of shared cognition and its relationship or effect on teams. Consequently, factor four will be named and designated as SHARED COGNITION IN TEAMS.

Table 30. *Factor 3 (1996-2001): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	The predictive validity of cognitive ability tests: A UK meta-analysis (4)
2	Personnel selection: Looking toward the future - Remembering the past (4)
3	Validity of general mental ability for the prediction of job performance and training success in Germany: A meta-analysis (4)
4	Comparing criterion-related validities of different intelligence tests for the prediction of training success in Germany: A meta-analysis (4)
5	Reconsidering the use of personality tests in personnel selection contexts (4)
6	Cognitive and GMA testing in the European community: Issues and evidence (4)
7	International validity generalization of GMA and cognitive abilities: A European community meta-analysis (4)
8	A meta-analysis of the relationship between job satisfaction and employee health in Hong Kong (3)
9	Cross-national job stress: a quantitative and qualitative study (3)

Table 31. *Factor 4 (1996-2001): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	The collective construction of work group moods (4)
2	Confronting failure: antecedents and consequences of shared beliefs about failure in organizational work groups (4)
3	Old wine in a new bottle: Impact of membership change on group creativity (4)
4	Differential access to information and anticipated group interaction: Impact on individual reasoning (2)
5	Methods for diagnosing interaction strategies - An application to group interaction in conflict situations (2)
6	The effects of member expertise on group decision-making and performance (2)
7	Transactive memory systems in organizations: Matching tasks, expertise, and people (2)
8	Team learning: Collectively connecting the dots (2)
9	Combining advice: The weight of a dissenting opinion in the consensus (2)
10	Positive reactions to working in groups in a study of group and individual goal decision making (2)

Factor 5: Untitled

The articles that loaded onto factor five dealt with the following subjects: self-organizing behavior, affective race bias, modularity, implicit task performance, supramodular interaction theory, use of automatic processes in self-control, and how intentional contents control action. Only one article was found that cited the three highest authors with the three highest factor loadings together and six articles were found that cited the two highest authors with the two highest factor loadings together. A list of these articles appears in Table 32, *Factor 5 (1996-2001): Articles Reviewed*. After reading through the titles and abstracts of these documents, it was clear that the overarching subject matter was individual cognition. However, this is a rather large subject and the topics found were not consistent. Due to this inconsistency, it would not be helpful to the reader to categorize the factor. As a result, factor five will not be named and will be designated as UNTITLED.

Table 32. *Factor 5 (1996-2001): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Self-organization of cognitive performance (3)
2	Individual differences in the activation and control of affective race bias as assessed by startle eyeblink response and self-report (2)
3	Modularity in cognition: Framing the debate (2)
4	Separating multiple processes in implicit social cognition: The quad model of implicit task performance (2)
5	The function of phenomenal states: Supramodular interaction theory (2)
6	Automatic processes in self-regulation: Implications for alcohol interventions (2)
7	Intentional contents and self-control (2)

Co-citation Analysis 4 (2002-2007)

After the extraction was conducted for the 2002-2007 time period, the analysis indicated that 6 factors best represented the data. These 6 factors also accounted for 83.75 % of the total variance (Field, 2005, p. 652). In accordance with the majority of factor analyses, most of the total variance was encapsulated in the first few factors (Field, 2005, p. 652). After careful consideration of each factor, the total number of factors was reduced to five, accounting for 77.77% of the variance. Once again, the factor analysis was top heavy, meaning that a majority of the variance was found in the first few factors. Nineteen of the authors loaded onto one factor and two authors loaded onto two factors. A summary of the author breakdown for each factor is as follows: six authors loaded onto factor one, four authors loaded onto factor two, five authors loaded onto factor three, six authors loaded onto factor four, and two authors loaded onto factor five. The factor analysis output for the 2002-2007 time period can be viewed in Table 33, *Factor Analysis Loadings (2002-2007)*.

Table 33. *Factor Analysis Author Loadings (2002-2007)*

Factor 1	
Author	**Loading**
Marks MA	0.855
Burke CS	0.854
Zaccaro SJ	0.840
Hollingshead AB	0.811
Salas E	0.696
Levine JM	0.454
Factor 2	
Author	**Loading**
Gully SM	0.886
Mathieu J	0.768
Bandura A	0.758
Mohammed S	0.718
Factor 3	
Author	**Loading**
Bell BS	0.925
Kozlowski SWJ	0.913
Kraut RE	0.789
Ryan AM	0.579
Edmondson AC	0.466
Factor 4	
Author	**Loading**
Ilgen DR	0.858
Jundt D	0.858
Salas E	0.569
Klein G	0.539
Edmondson AC	0.448
Levine JM	-0.492
Factor 5	
Author	**Loading**
Klein KJ	0.935
Spector PE	0.907

Factor 1: The Impact of Shared Cognition on Team Performance

Two articles were found that cited the four authors with the four highest factor loadings together. In addition, twenty-three articles were identified that cited the three

authors with the three highest factor loadings together, but the first eight were reviewed. A list of these articles is found in Table 34, *Factor 1 (2002-2007): Articles Reviewed.* Some of the topics that consistently appeared throughout the articles included: knowledge embedded in group structure and processes, shared cognition and group identification, diversity in collaboration, and shared mental models and knowledge. These documents were primarily interested in investigating the relationship between shared cognition and team performance. For instance, many of the articles analyzed topics such as team knowledge, team processes, and shared mental models. These topics were then connected to the overall intention of the research, which was to determine a method to increase team performance. As a result, an appropriate name for factor one is THE IMPACT OF SHARED COGNITION ON TEAM PERFORMANCE.

Factor 2: Team Member Relationships and Performance

For factor two, one document was reviewed that cited the four authors with the four highest factor loadings together, three documents were reviewed that cited the three authors with the three highest factor loadings together, and six documents were reviewed that cited the two authors with the two highest factor loadings together. A list of these articles is found in Table 35, *Factor 2 (2002-2007): Articles Reviewed*. The major concepts of the articles were extracted and are as follows: individual behavior, individual relationships, collective cognition, team inputs and outputs, and information sharing in teams. In general, these documents focused its efforts on analyzing the interactions that exist within a team. The information learned from these relationships was applied to help predict team performance. Consequently, an appropriate name for factor two is TEAM MEMBER RELATIONSHIPS AND PERFORMANCE.

Table 34. *Factor 1 (2002-2007): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Transactive memory systems, learning, and learning transfer (4)
2	Shared cognition as a product of, and precursor to, shared identity in negotiations (4)
3	Using Brunswikian theory and a longitudinal design to study how hierarchical teams adapt to increasing levels of time pressure (3)
4	Considering diversity: Multivoicedness in international academic collaboration (3)
5	Preserving knowledge legacies: workforce aging, turnover and human resource issues in the US electric power industry (3)
6	Differentiating knowledge in teams: The effect of shared declarative and procedural knowledge on team performance (3)
7	How to turn a team of experts into an expert medical team: guidance from the aviation and military communities (3)
8	Understanding team adaptation: A conceptual analysis and model (3)
9	A multilevel examination of the relationships among training outcomes, mediating regulatory processes, and adaptive performance (3)
10	Representational gaps, information processing, and conflict in functionally diverse teams (3)

Table 35. *Factor 2 (2002-2007): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Self-efficacy and work-related performance: The integral role of individual differences (4)
2	Collective cognition in action: Accumulation, interaction, examination, and accommodation in the development and operation of group efficacy beliefs in the workplace (3)
3	An examination of the dynamic relationship between self-efficacy and performance across levels of analysis and levels of specificity (3)
4	A longitudinal examination of the comparative criterion-related validity of additive and referent-shift consensus operationalizations of team efficacy (2)
5	A multilevel examination of the relationships among training outcomes, mediating regulatory processes, and adaptive performance (2)
6	Antecedents and consequences of the service climate in boundary-spanning self-managing service teams (2)
7	Linking employee confidence to performance: A study of self-managing service teams (2)
8	Antecedents and consequences of group potency: A study of self-managing service teams (2)
9	Teams in organizations: From input-process-output models to IMOI models (2)
10	Cutthroat cooperation: Asymmetrical adaptation to changes in team reward structures (2)

Factor 3: Virtual Teams

In the analysis of factor three, three articles were identified that cited the three authors with the three highest factor loadings together and 72 articles were found that cited the two authors with the two highest factor loadings together. Seven of the latter articles were review in the subsequent analysis. A list of these articles appears in Table 36, *Factor 3 (2002-2007): Articles Reviewed*. Many of the concepts discussed in the articles focused on the use of technology in teams and are as follows: distributed teammates, feedback in virtual teamwork, computer mediated groups, virtual team learning simulation, globally distributed teams, and goal establishment and task performance. A majority of the documents examined geographically dispersed or computer mediated teams. With the increased use of virtual teams in recent years, these papers attempted to discover the effectiveness of these types of teams. After considering all of this information, factor three will be named VIRTUAL TEAMS.

Factor 4: Team Cognition and Team Performance

Eleven articles were identified as candidates to review for factor four. Among these papers, 10 were reviewed that cited the three authors with the three highest factor loadings together. A list of these articles appears in Table 37, *Factor 4 (2002-2007): Articles Reviewed*. Some of the main topics discussed in the documents included: team cognition in command and control, virtual teams, impact of group diversity on group cognition, team mental models, team situation awareness, shared mental model, team processes, and teamwork training and performance. These articles covered nearly every topic in the team cognition literature. Upon consideration of this, factor four will be named and designated as TEAM COGNITION AND TEAM PERFORMANCE.

Table 36. *Factor 3 (2002-2007): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Situation invisibility and attribution in distributed collaborations (3)
2	Effects of process feedback on motivation, satisfaction, and performance in virtual teams (3)
3	Reactions to unfair events in computer-mediated groups: A test of uncertainty management theory (3)
4	Remote control: Predictors of electronic monitoring intensity and secrecy (2)
5	When does the medium matter? Knowledge-building experiences and opportunities in decision-making teams (2)
6	The contexts of knowing: natural history of a globally distributed team (2)
7	The impact of individual expectations and expectation conflicts on virtual teams (2)
8	Influence of achievement goals and self-efficacy on students' self-regulation and performance (2)
9	The role of state goal orientation in the goal establishment process (2)
10	Recognizing and utilizing expertise in work groups: A status characteristics perspective (2)

Table 37. *Factor 4 (2002-2007): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Team cognition in experienced command-and-control teams (3)
2	Emergent states in virtual teams: a complex adaptive systems perspective (3)
3	The effects of groups' variety and disparity on groups' cognitive complexity (3)
4	Leadership in team-based organizations: On the threshold of a new era (3)
5	System breakdown: The role of mental models and transactive memory in the relationship between acute stress and team performance (3)
6	Measuring team situation awareness in decentralized command and control environments (3)
7	Enhancing the effectiveness of work groups and teams (3)
8	Evaluating an individually self-administered generic teamwork skills training program across time and levels (3)
9	Teamwork behaviors - A review and an integration of frameworks (3)
10	The role of leaders in shaping formal team nonns (3)

Factor 5: Work-Family Conflict

Because only two authors were loaded onto factor five, a limited number of articles were found. Eight articles were found that cited the authors on the factor together. A list of these articles appears in Table 38, *Factor 5 (2002-2007): Articles Reviewed*. Despite the limited number of articles, it was apparent that the theme of the factor was WORK-FAMILY CONFLICT. Each article investigated and directly discussed this topic.

Table 38. *Factor 5 (2002-2007): Articles Reviewed*

	Title (Number of Authors Cited Together)
1	Predicting work-family conflict from workload, job attitudes, group attributes, and health: A longitudinal study (2)
2	Job characteristics and college performance and attitudes: A model of work-school conflict and facilitation (2)
3	A review of research methods in IO (2)
4	Work and family research in IO (2)
5	Work and family satisfaction and conflict: A meta-analysis of cross-domain relations (2)
6	A longitudinal and multi-source test of the work-family conflict and job satisfaction relationship (2)
7	Work-family conflict: Experiences and health implications among immigrant Latinos (2)
8	A cross-national comparative study of work-family stressors, working hours, and well-being: China and Latin America versus the Anglo world (2)

Multidimensional Scaling

Once all four of the factor analyses were completed, a multidimensional scaling analysis (MDS) was conducted on each co-citation analysis. As previously stated, the MDS analysis will produce a two-dimensional MDS illustration, or literature map, that depicts the relationship between the identified authors. In order to start the process of creating these maps, *SPSS* was used to generate an initial chart. After the initial chart was produced, the information gathered from the factor analyses was applied and the finishing touches were implemented. In other words, factor boundaries were drawn around the outside of the author that loaded onto each factor. In addition, a color coded legend was placed on each map to make it easy to identify the factors.

The finalized MDS map for each co-citation analysis had a similar layout and as a result, a general discussion will be made to apply to each figure. As discussed in chapters one and three, the author co-citation analysis assumes that the research interests of the authors will be distinct and organized into clearly defined regions. These regions represent the factor boundaries and are intended to portray the relationships between the different groups of authors. In this study, the boundaries for each factor were not separate regions that could be easily distinguished from one another. Instead, nearly every boundary for nearly every factor on every literature map overlapped. This suggests that the progression of team cognition literature is dependent upon the integrated efforts of many of the authors that loaded onto each factor. The themes named in each co-citation analysis play an important role, large or small, in the advancement and refinement of team cognition. If this was not true, then the factor boundaries would be clearly observed and isolated from each other. As noted, this is not the case, and the

efforts of a significant portion of the authors seem to be reliant on each other's research interests.

Despite the above inferences, the results from the MDS maps are inconclusive and are not supported. In other words, the layout of the data point did not produce any definitive conclusions and therefore, no definitive conclusions should be drawn from the maps. As mentioned in chapter three, the dimensions of the maps are subjective and determined by the researcher (Garson, 2006). As a result of the high factor overlap and an inability to distinguish the data points, the axes were not labeled.

Co-citation Analysis 1 (inclusion of all literature)

The results for the MDS map can be viewed in Figure 3, *Literature Map 1 (All-inclusive)*.

Co-citation Analysis 2 (1990-1995)

The results for the MDS map can be viewed in Figure 4, *Literature Map 2 (1990-1995)*.

Co-citation Analysis 3 (1996-2001)

The results for the MDS map can be viewed in Figure 5, *Literature Map 3 (1996-2001)*.

Co-citation Analysis 4 (2002-2007)

The results for the MDS map can be viewed in Figure 6, *Literature Map 4 (2002-2007)*.

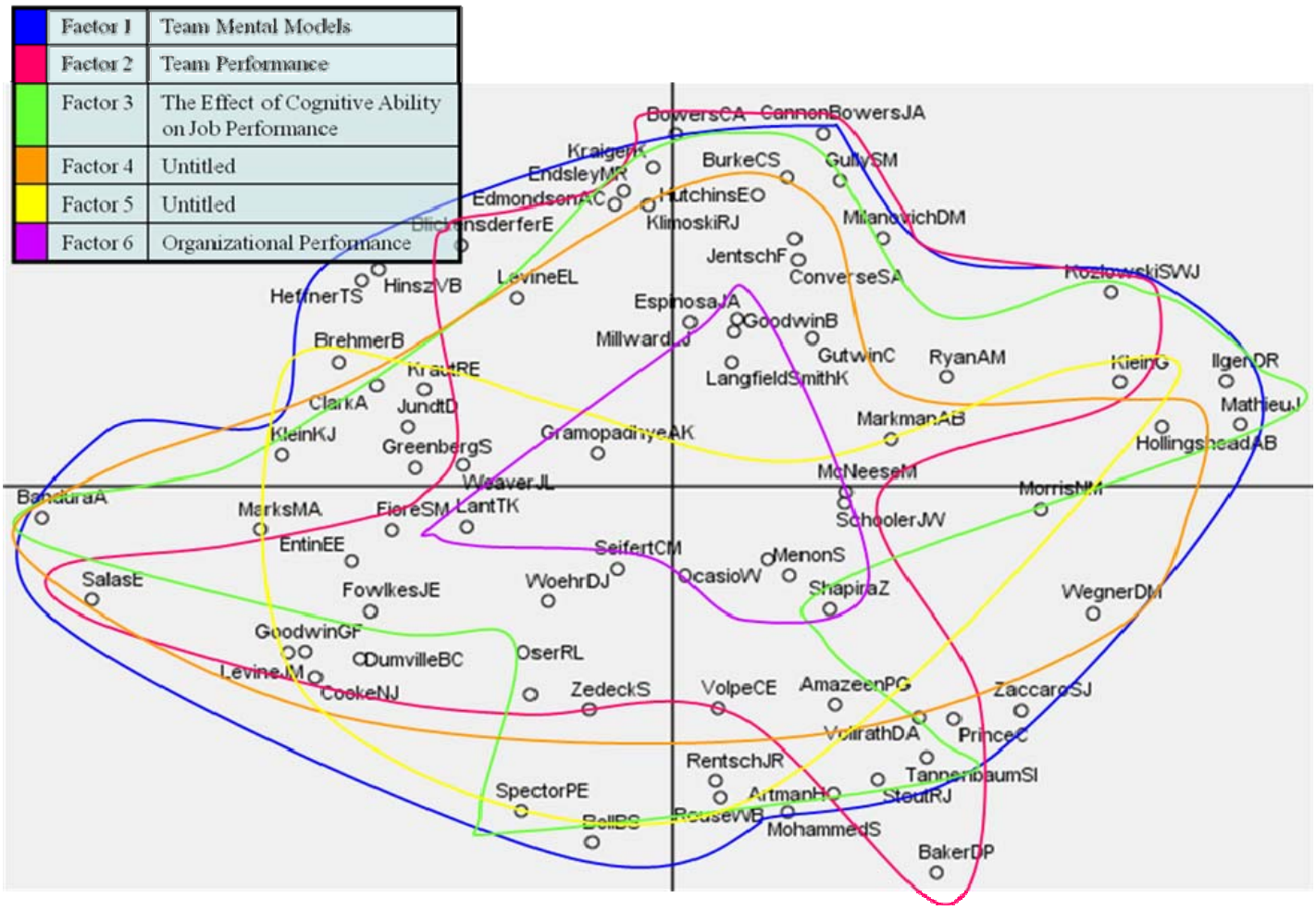

Figure 3. Literature Map 1 (All-inclusive).

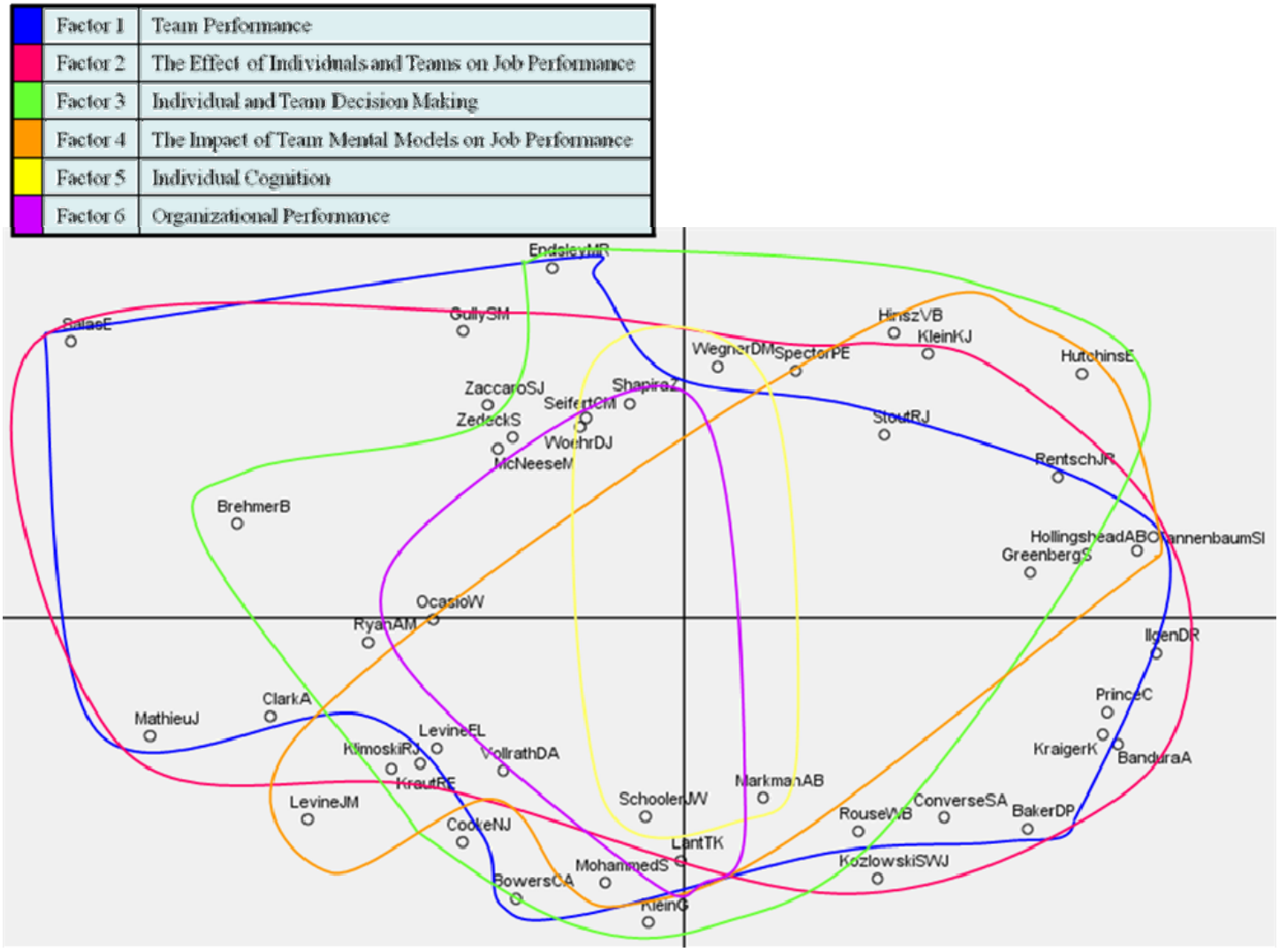

Figure 4. Literature Map 2 (1990-1995).

	Factor 1	Team Processes and Performance
	Factor 2	Teams in Organizations
	Factor 3	The Effect of Cognitive Ability on Job Performance
	Factor 4	Shared Cognition in Teams
	Factor 5	Untitled

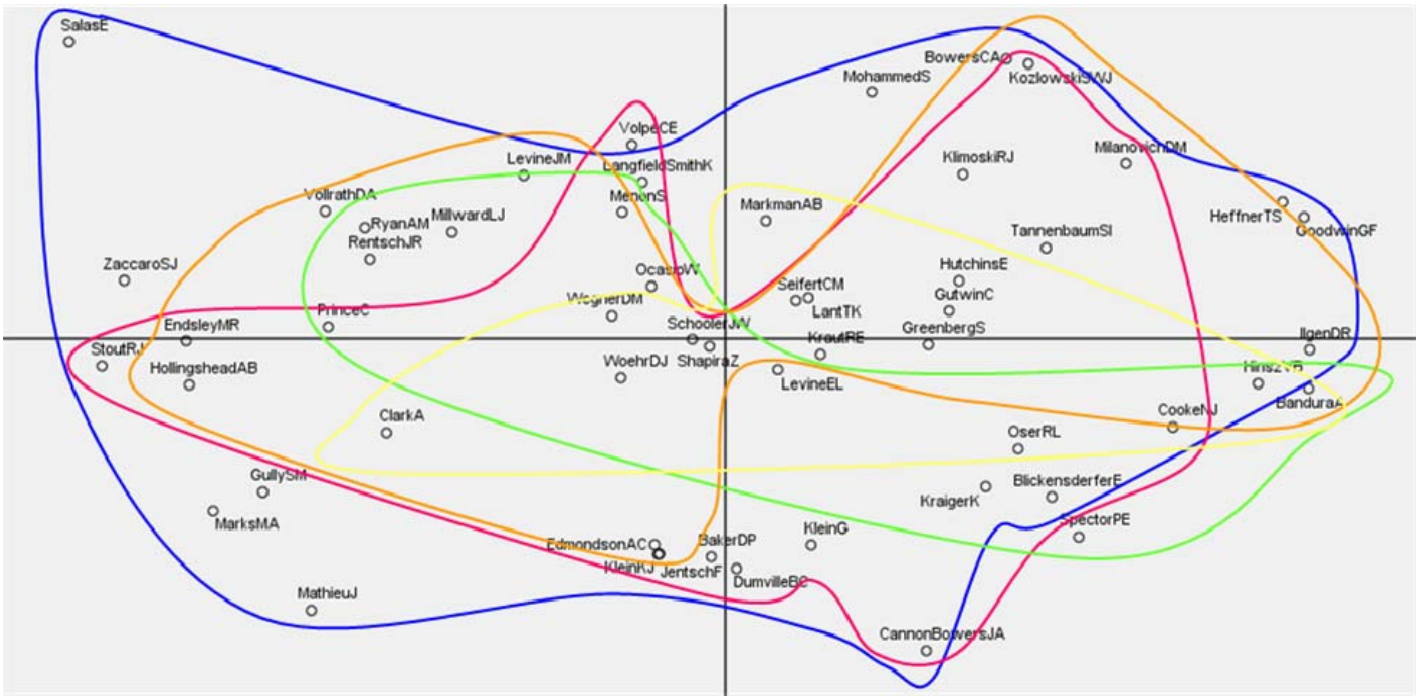

Figure 5. Literature Map 3 (1996-2001).

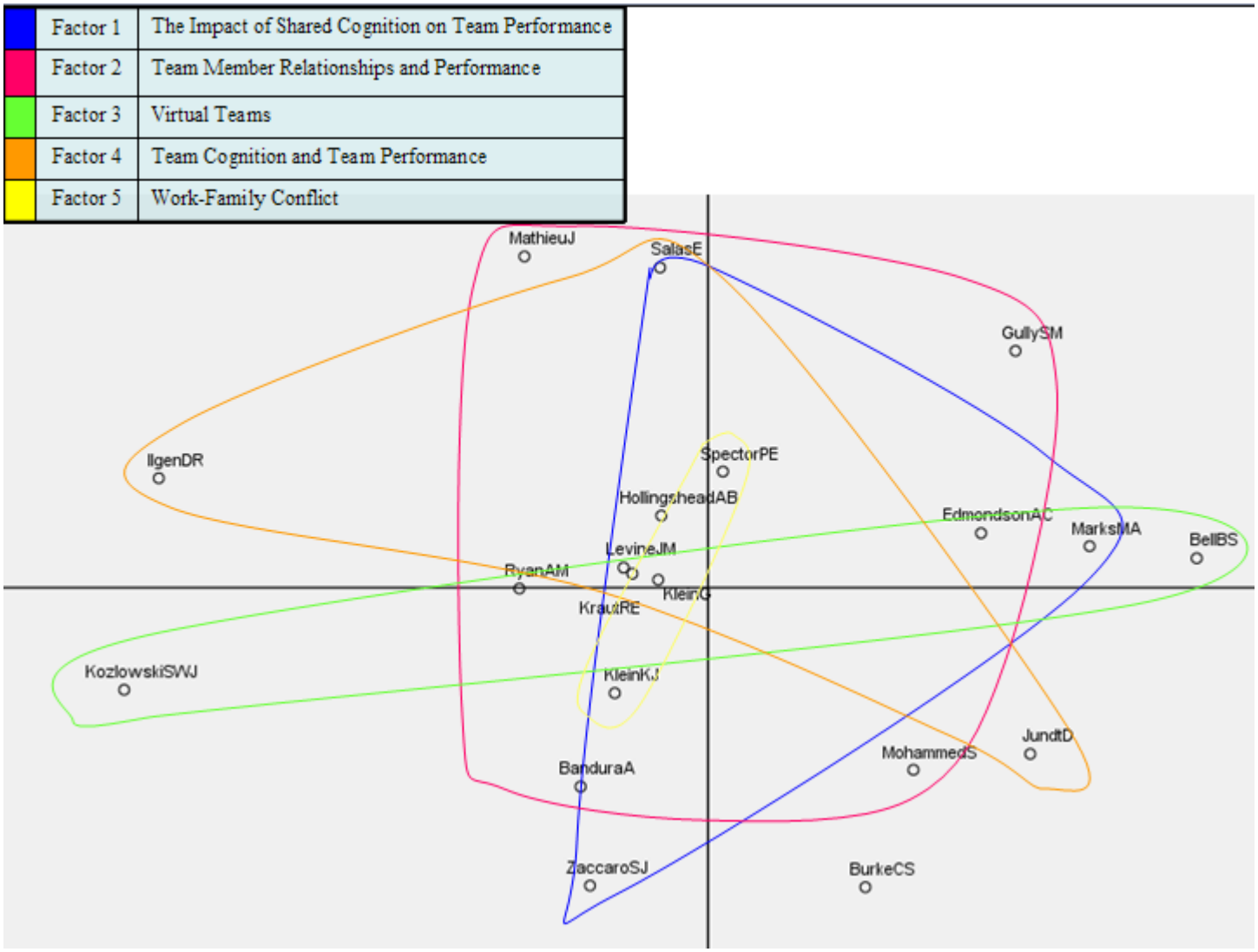

Figure 6. Literature Map 4 (2002-2007).

Summary

Throughout the course of this chapter the results of the four co-citation analysis were reported. An author co-citation matrix was developed for each co-citation analysis, which served as a foundation for evaluating the authors and their respective research interests. The co-citation matrices helped produce several critical steps useful to the research process and these included: four correlation matrices, four tables of the diagonal value ranking, four factor analyses, and four literature maps. These research products have begun and will continue to answer the three research questions identified in this research endeavor.

V. Discussion

Teams are an essential part of the modern organization. Leaders of organizations rely heavily upon teams to accomplish the required work and tasks. These leaders expect these teams to be far more synergistically effective and far more efficient than the sum of work of any grouping of individuals. Interestingly, as noted earlier, many teams fail to measure up to the lofty expectations set forth by the managers or leaders of the organizations (Salas & Fiore, 2004). Team cognition as a subject matter was developed to address the goal of understanding how to optimize the performance of teams. In the last twenty years or so, team cognition researchers have diligently sought to investigate these topics.

With this in mind, the purpose of this endeavor was to analytically organize the published research that has already been accomplished on team cognition. In order to quantify the analysis and centralize the focus of this topical exploration, three research questions were developed. Although these questions have been presented several times throughout this study, they are stated one more time to adequately frame the chapter. Because chapter four reported the results of the co-citation analyses, the purpose of this chapter was to directly and systematically answer the research questions. After the questions have been answered, the limitations and weaknesses of the research were identified. In order to continue to build upon this research effort, some possible future research opportunities were specified.

Research Question 1: ***What authors have significantly impacted team cognition research?***

The co-citation analyses served as an effective method of investigating the authors involved in team cognition publications and determining which authors have significantly impacted team cognition as a research domain. Each analysis provided a visual representation of the resulting counts and this made it easy to compare the authors. In other words, the co-citation analyses show the strength of contribution each author has on team cognition research. Essentially, the higher the number of co-citation counts an author has received the more influence the author has on the development of team cognition. The matrices that display the co-citation counts are Appendices C, E, G, and I.

Another method of determining the impact of an author on team cognition was the calculation of the diagonal value in these matrices. As previously mentioned, the purpose of the diagonal value is to indicate the importance of an author relative to the other authors included in the co-citation matrix. Salas was the only author to be in the top five in each of the four diagonal value ranking tables, which is a good indication that he is one of, if not the most important author in team cognition research today. Despite this, the diagonal value is not a completely reliable indicator of author importance. Because of the way the diagonal value is calculated, an author would only need one, two, or three high co-citation counts to receive a high diagonal value ranking. For example, an author that has received two or three extremely high co-citation counts, but minimal co-citation counts with other authors would appear more important than an author that has received moderately high co-citation counts with nearly every author. Tables 9-12 can be referenced to review the rank order of co-citation intersections.

Table 39, *Top Five Author Comparison*, shows the comparison between the top five authors with the highest total sum of co-citation counts and the top five authors with the diagonal values for each co-citation analysis. Table 39 helps confirm the validity of the diagonal value ranking because the top five authors for each category were extremely similar. Two of the time periods, 1990-1995 and 1996-2001, had the same authors in the top five, but in a different order. The other two co-citation analyses only had one author change. Based on these rankings, the authors in Table 39 are some of the most important authors in team cognition research.

Table 39. *Top Five Author Comparison*

All-inclusive

Author Name	Total Co-citation Count Ranking	Diagonal Value Ranking
Salas E	1	3
Bandura A	2	1
Mathieu J	3	2
Ilgen DR	4	4
Kozlowski SWJ	5	-
Spector PE	-	5

1990-1995

Author Name	Total Co-citation Count Ranking	Diagonal Value Ranking
Salas E	1	1
Mathieu J	2	3
Tannenbaum SI	3	2
Kraiger K	4	4
Prince C	5	5

1996-2001

Author Name	Total Co-citation Count Ranking	Diagonal Value Ranking
Salas E	1	1
Mathieu J	2	3
Cannon-Bowers JA	3	2
Marks MA	4	4
Zaccaro SJ	5	5

2002-2007

Author Name	Total Co-citation Count Ranking	Diagonal Value Ranking
Kozlowski SWJ	1	1
Ilgen DR	2	4
Burke CS	3	3
Bell BS	4	2
Zaccaro SJ	5	-
Salas E	-	6

Research Question 2: ***What are the emergent themes within team cognition literature that can be identified?***

The second research question was completed by segregating groups of authors according to research interests using the factor analysis. One of the crucial components of answering this question was to generate a sufficient author list that would encompass the different areas of team cognition research. As stated previously, team cognition scholars were called upon to provide the author list. For each co-citation analysis, names were assigned to each factor. The names of the factors were dependent upon the publications discovered that cited the authors with the highest factor loadings. Essentially, the title assigned to each factor represents an area of research. In keeping with this stream of logic, an author assigned to a factor is considered to be publishing research in accordance with the factor name. Throughout the research process, four factor analyses were performed. As a result, 22 distinct factors, or research areas, have been identified and can be viewed in Table 40, *Summary of Factor Analysis Titles*.

Table 40. *Summary of Factor Analysis Titles*

All-Inclusive	
Factor	**Assigned Title**
1	Team Mental Models
2	Team Performance
3	The Effect of Cognitive Ability on Job Performance
4	Untitled
5	Untitled
6	Organizational Performance
1990-1995	
Factor	**Assigned Title**
1	Team Performance
2	The Effect of Individuals and Teams on Job Performance
3	Individual and Team Decision Making
4	The Impact of Team Mental Models on Job Performance
5	Individual Cognition
6	Organizational Performance
1996-2001	
Factor	**Assigned Title**
1	Team Processes and Performance
2	Teams in Organizations
3	The Effect of Cognitive Ability on Job Performance
4	Shared Cognition in Teams
5	Untitled
2002-2007	
Factor	**Assigned Title**
1	The Impact of Shared Cognition on Team Performance
2	Team Member Relationships and Performance
3	Virtual Teams
4	Team Cognition and Team Performance
5	Work-Family Conflict

As observed in Table 40, *Summary of Factor Analysis Titles,* the themes given to each factor were wide ranging. Despite this observation, the factor titles shared common

ground. For instance, some of the publications discussed individual cognitive abilities and this subject may not appear to have anything to do with team cognition. However, an essential part of a team is the individuals that comprise the team and as a result, individual cognitive abilities and team cognition are complementary research areas. The common characteristics shared by the factors derived from the factor analyses demonstrate that the paths of research followed by the authors in this study are highly integrated. This inference was further substantiated by the literature maps that were created to visually illustrate the relationships of the factors to one another. As seen in the four MDS maps, Figures 2-5, most of the factor boundaries intersected. Although many different research areas emerged from the literature reviewed in the *SSCI* database, the information provided above supports the assertion that they are integrated.

Table 41, *Themes Extracted from the Literature Review*, is a summary of the themes identified in chapter two. A few of the themes from Table 41 share some of the same wording as the factors in Table 40, *Summary of Factor Analysis Titles*. For instance, themes like "Shared Mental Model" and "Shared Cognition" commonly occurred in both the literature review and the co-citation analyses. This suggests that many of the authors included in this study are interested in these topics. In addition, the frequent occurrence of these themes also indicates that these themes are foundational to understanding and analyzing team cognition. It is important to note that although the three remaining topics in Table 41 were not included in the titles of the factor, this does not mean that the topics are not important to team cognition research. Instead, these specific topics are necessary in order to understand and further the factors identified in Table 40. In general, the themes in Table 41 are quite different from the factors in Table

40. The themes from Table 41 are specific and detailed, whereas the factors in Table 40 are much more general. The reason the factors are broad is because they had to encompass the research efforts of numerous authors. On the other hand the themes in Table 41 were directly taken from specific publications.

Table 41. *Themes Extracted from the Literature Review*

Shared Mental Model
Shared Cognition
Environment and Context
Awareness
Coordination/Communication

Research Question 3: ***How has team cognition research evolved throughout its lifetime?***

To answer the third research question, the three time period author co-citation analyses was reviewed. As noted throughout this research effort, the specific time periods were 1990-1995, 1996-2001, and 2002-2007, which enabled the development of team cognition research to be tracked. Despite the identified weaknesses of the diagonal value, it is a useful measure to compare the time periods. As a result, Table 42, *Overall Diagonal Value Ranking Summary*, displays the diagonal value ranking received by each author according to the three distinct time periods. Table 42 shows a progression of the relative importance of each author from 1990 to 2007.

Table 42. *Overall Diagonal Value Ranking Summary*

Author Name	Ranking 1990-1995	Ranking 1996-2001	Ranking 2002-2007	Author Name	Ranking 1990-1995	Ranking 1996-2001	Ranking 2002-2007
Baker DP	6	32	-	Langfield-Smith K	-	45	-
Bandura A	10	11	12	Lant TK	25	52	-
Bell BS	-	-	2	Levine EL	40	39	-
Blickensderfer E	12	25	-	Levine JM	8	38	19
Brehmer B	29	-	-	Markman AB	42	43	-
Bowers CA	-	14	-	Marks MA	-	4	7
Burke CS	-	-	3	Mathieu J	3	3	9
Cannon-Bowers JA	-	2	-	McNeese M	44	-	-
Clark A	35	41	-	Menon S	-	34	-
Converse SA	28	-	-	Milanovich DM	-	15	-
Cooke NJ	36	24	-	Millward LJ	-	42	-
Dumville BC	-	22	-	Mohammed S	14	17	11
Edmondson AC	-	33	13	Ocasio W	38	51	-
Endsley MR	11	35	-	Oser RL	-	29	-
Goodwin GF	-	7	-	Prince C	5	26	-
Greenberg S	41	47	-	Rentsch JR	21	37	-
Gully SM	31	8	10	Ryan AM	32	23	17
Gutwin C	-	44	-	Salas E	1	1	5
Heffner TS	-	6	-	Schooler JW	24	48	-
Hinsz VB	26	12	-	Seifert CM	37	53	-
Hollingshead AB	18	28	16	Shapira Z	30	54	-
Hutchins E	17	49	-	Spector PE	9	18	15
Ilgen DR	13	16	4	Stout RJ	23	10	-
Jentsch F	-	21	-	Tannenbaum SI	2	31	-
Jundt D	-	-	8	Vollrath DA	33	-	-
Klein G	15	19	20	Volpe CE	-	27	-
Klein KJ	19	20	14	Wegner DM	16	40	-
Klimoski RJ	43	36	-	Woehr DJ	39	50	-
Kozlowski SWJ	7	9	1	Zaccaro SJ	22	5	6
Kraiger K	4	30	-	Zedeck S	34	-	-
Kraut RE	27	46	18				

It is important to note that five authors that received a diagonal value from 1990 to 1995 were removed from the list in the 1996-2001 time period. On the other hand, 14 authors that did not receive a diagonal value in 1990-1995, received a value in 1996-

2001. This suggests that the author interest in team cognition research was growing in the 1996-2001 time period. From the 1996-2001 time period to the 2002-2007 time period, 36 authors were removed from the diagonal value list. In contrast, three authors received a value in 2002-2007 that did not receive a diagonal value in 1996-2001. The last two statements suggest a large drop off in team cognition research interest. However, this could be misleading for two reasons. First, the publications written in the 2002-2007 time period had the least amount of time of all the time periods to receive citation counts. As a result, the citation and the co-citation counts from 2002-2007 are deceptively low because they simply have not had the time to sufficiently accumulate. Second, the methods used by this study do not reward emerging authors. Consequently, an author may have recently published an article that will have great impact on team cognition research; however, due to the limitations of an author co-citation analysis, this kind of author will be overlooked.

Another important aspect that can be drawn from Table 42 is that it identifies the foundational authors of team cognition research. As noted a few times throughout this study, Salas has been the most prominent author in team cognition. In fact, Salas is the only author to appear in the top five of each diagonal list. Some of the other contributing authors include Mathieu, Ilgen, Kozlowski, Mohammed, Bandura, and Zaccaro. These authors have been the pillars of team cognition and have been instrumental in its development over the past 18 years.

In order to fully answer question three, the titles of the factors (Table 39, *Summary of Factor Analysis Titles*) in each time period were analyzed. During the first time period, only two of the six identified factors strictly focused on teams. In the 1996-

2001 period, three of the five identified factors exclusively focused on teams, whereas the last time period, 2002-2007, saw four of the five factors focus on teams. These observations suggest research refinement is occurring in team cognition. In other words, the authors used in this study are moving from an individual and team research focus to a more concentrated focus on just teams. As previously mentioned, this conclusion may be somewhat misleading due to the minimal amount of accumulated data in the 2002-2007 time period. It is also important to note that in the last two time periods, many authors included technology in their research on teams. During these time periods, authors used video games or computer simulations as effective scenarios for the analysis of teams. In fact, many of the publications reviewed from 2002-2007 discussed the use and impact of virtual teams in organizations. In recent years, an increased emphasis on the incorporation of technology into an organizational lifestyle is common. As a result, it is logical that the most recent articles are applying the use of technology to the advancement team cognition research.

Limitations/Weaknesses of the Research

In order to present an honest assessment of this research endeavor, it is necessary to identify the limitations or weaknesses. Although some of the limitations have already been recognized, they will be mentioned again in this section. A few of the weaknesses of this study can be associated with the scholarly personnel that were contacted. Instead of responding to the letter with a list of the pertinent information, some of the scholars referenced an article or vita from which to extract information. As a result, some of the information taken from these references may have been unnecessary. The scholarly personnel that were contacted did their best to provide reliable information; however,

because team cognition is not a clearly defined research area, the information provided may have been misleading. In addition, the process of gathering data through selected scholarly personnel is completely subjective and open to bias. Consequently, the scholars may or may not have provided information that is as significant as they perceived. These initial weaknesses in the methodology may have contributed to a longer than needed author list and/or an author list that is missing significant authors.

Because the *SSCI* database was heavily used, some additional limitations can be identified. The *SSCI* database is updated daily for new publications. Although this is an excellent characteristic of the database, it was a weakness for this study because the data took more than one day to gather. In other words, some parts of the data may be more up to date than others. As previously mentioned, the collection of the citation counts was difficult in the database because some authors are referenced according to their first initial only. Consequently, several other authors may have the same reference name, so it was challenging to distinguish the particular author in question. In addition, approximately 10% of the articles did not have an abstract, which made it more challenging to name the factors. As mentioned earlier in this chapter, the writings from 2002-2007 had the least amount of time to accumulate citations.

Another limitation of this study is that the method used to assign titles to the factors was completely subjective. The subjectivity of this portion of the analysis was minimized by selecting articles that cited authors with the highest factor loadings together. Despite this, the naming of the factors was a notable limitation. More specifically, after the articles were transferred to the *Refworks* database, the first 10 articles were selected to name the factor. As a result, the factor themes extracted from

the article samples may not have been representative of the article populations. In addition, this phase of theme identification limits the methodology by potentially limiting the statistical significance of the themes selected. This weakness only occurs when the number of articles is greater than 10. It is also important to note that several of the publications that were heavily relied upon to conduct the co-citation analyses were from the 1980s and 1990s. As a result of this, the techniques used may not have been desirably current.

A notable weakness in this research was the multidimensional scaling. As discussed several times throughout this report, an author co-citation analysis assumes that the authors publish in specific research niches. However, many of the authors in this report do not have one specific research interest, so they publish on a multitude of subjects. As indicated in chapter four, the assumption stated above was not met. The co-citation analysis process is frustrated because it yields confusing results when performed on a young, unorganized subject matter like team cognition. Each factor in each MDS map showed a significant level of overlap. Consequently, it was difficult to make assertive conclusions; however, it did indicate that the advancement of the team cognition literature is integrally dependent upon the authors included in each factor. As a result of the lack of confidence in the MDS maps, the results produced were inconclusive.

Future Research Opportunities

In response to the limitations above, a few research opportunities were offered. To continue to track the evolution of team cognition another co-citation analysis could be performed in a few years. After several years, the writings from 2002-2007 will have had enough time to gather a sufficient number of citations. If this is completed, it would be

necessary to refine the list of authors by eliminating unnecessary authors and adding authors that were missed or authors that have recently emerged. Another research opportunity available would be to conduct an analysis that would increase the number of time periods and decrease the number of years per time period. An analysis such as this would allow the researcher to more thoroughly track the changes in team cognition research throughout its lifetime. In addition to the literature maps, the researcher could investigate other methods of presenting the data such as a cluster analysis.

Conclusion

The purpose of this chapter was to discuss the results obtained and reported in chapter four. In order to accomplish this effectively and logically, the three research questions were answered. The co-citation counts and the diagonal values illustrated identified the important authors within team cognition research, the factor analyses identified the different areas within team cognition research, and the three time period analyses provided insight into the evolution of team cognition research. Once the three research questions were sufficiently answered, limitations of the research and further research opportunities were identified.

Overall, the purpose of this paper was to analyze the published literature that has contributed to the advancement of team cognition research. Using factor analysis and multidimensional analysis techniques, visual maps were constructed that highlighted the seminality and influence of specific authors, relationships between authors, as well as branching and relationships of sub-domains in the literature over time. Throughout the methodology, co-citation counts were obtained and factors were classified. These efforts substantiated the results reported in chapter four and explained in chapter five. As a

result of the information provided in this study, team cognition researchers now have access to a tool they can use to better inform their efforts. More specifically, team cognition researchers now have greater insight into where the field has been and what new directions may be emerging. The application of the information in this study could be beneficial to the refinement and refocus of future team cognition research.

Appendix A. Contacted Scholar Information.

	Name	Author	Editor	E-mail	Contact Information
1	Eduardo Salas	x		esalas@ist.ucf.edu	http://psych.ucf.edu/faculty_salas.php
2	Ann Marie Ryan (Editor of Personnel Psychology)	x	x	Ryanan@msu.edu	http://psychology.msu.edu/People/ faculty/ryan.htm
3	Nancy J. Cooke (Editor of Human Factors)	x	x	Nancy.Cooke@asu.edu; ncooke@cerici.org	http://www.cerici.org/media&pubs/ documents/otherdocs/n-cooke-vitae.pdf
4	Janis A. Cannon-Bowers	x		jancb@ist.ucf.edu	
5	Janice H. Laurence (Editor of Military Psychology)		x	jhlaurence@cox.net	http://www.apa.org/divisions/ div19/images/milpsyjournalCONTRIBUTORS.pdf
6	Stephen M. Fiore	x		sfiore@ist.ucf.edu	
7	Sheldon Zedeck (Editor of the Journal of Applied Psychology)	x	x	zedeck@socrates.berkeley.edu	http://psychology.berkeley.edu/ faculty/profiles/szedeck.html
8	Joan R. Rentsch	x		jrentsch@utk.edu	http://bus.utk.edu/iopsyc/People /Rentsch.htm
9	David J. Woehr	x		djw@utk.edu	http://bus.utk.edu/mgt/woehr.htm
10	Verlin B. Hinsz	x		Verlin.Hinsz@ndsu.edu	http://www.psych.ndsu.nodak.edu/ hinsz/
11	Elliot E. Entin	x		eee1@brandeis.edu	
12	J. Albert Espinosa	x		alberto@american.edu	
13	Robert E. Kraut	x		robert.kraut@cmu.edu	
14	Jonathan W. Schooler	x		schooler@pitt.edu	http://www.lrdc.pitt.edu/faculty/ Schooler.html
15	John M. Levine	x		jml@pitt.edu	http://www.pitt.edu/~jml/
16	Carl Gutwin	x		gutwin @ cs.usask.ca	http://www.cs.usask.ca/faculty/ gutwin/
17	Saul Greenberg	x		saul.greenberg@ucalgary.ca	
18	Edwin Hutchins	x		ehutchins@ucsd.edu	http://hci.ucsd.edu/hutchins/
19	Andy Clark	x		Andy.Clark@ed.ac.uk	
20	Henrik Artman	x		artman@kth.se	http://www.nada.kth.se/~artman/
21	Janice Langan Fox	x		jalanganfox@swin.edu.au	

Appendix A (cont.)

22	Sharon Code	x		sgrant@swin.edu.au	
23	Kim Langfield-Smith	x		Kim.Langfield-Smith@ buseco.monash.edu.au	
24	A.K. Gramopadhye (Editor in Chief of the International Journal of Industrial Ergonomics)	x	x	agramop@eng.clemson.edu	http://www.elsevier.com/wps/find/ journaleditorialboard.cws_home/ 505654/editorialboard
25	John Mathieu	x		John.Mathieu@business.uconn.edu; JMathieu@business.uconn.edu	
26	Tonia S. Heffner	x		tonia.heffner@hqda.army.mil	
27	Colleen M. Seifert	x		seifert@umich.edu	
28	Arthur B. Markman (Editor in Chief of Cognitive Science)	x	x	markman@psy.utexas.edu	http://www.cognitivesciencesociety.org/ about.html
29	Jamie C. Gorman	x		jgorman@cerici.org	http://www.cerici.org/organization/staff.html
30	Jennifer L. Winner	x		jwinner@cerici.org	http://www.cerici.org/organization/staff.html
31	Kenneth McBey	x		kmcbey@yorku.ca	http://www.atkinson.yorku.ca/mhrm/ken.html
32	YOU-TA CHUANG	x		ychuang@yorku.ca	
33	Theresa K. Lant	x		tlant@stern.nyu.edu	
34	Zur Shapira	x		zshapira@stern.nyu.edu	
35	William Ocasio	x		wocasio@kellogg.northwestern.edu	
36	Steve W.J. Kozlowski	x		stevekoz@msu.edu	http://io.psy.msu.edu/koz/main.htm
37	Clint A. Bowers	x		bowers@mail.ucf.edu	http://psych.ucf.edu/faculty_bowers.php
38	Dr. Florian Jentsch	x		fjentsch@ucf.edu	http://psych.ucf.edu/faculty_jentsch.php
39	Kimberly Smith-Jentsch	x		kjentsch@mail.ucf.edu	http://psych.ucf.edu/faculty_smith-jentsch.php
40	Jay (Gerald) Goodwin	x		Jay.goodwin@hqda.army.mil	
41	Daniel R. Ilgen	x		ilgen@msu.edu	http://iopsych.msu.edu/ilgen/
42	John R. Hollenback	x		jrh@msu.edu	

Appendix B. Letter to Team Cognition Scholars.

27 Sep 07

Capt Ryan A. Howell
Air Force Institute of Technology Student
2950 Hobson Way
Wright-Patterson AFB OH 45433-7765

Dear Scholars

The purpose of this mailing is to gain responses listing important authors and works in the subject matter area of team cognition in order to support a thesis research effort to bibliometrically map team cognition literature.

I am currently a student completing my master's degree in Engineering Management at the Air Force Institute of Technology (AFIT) on Wright Patterson Air Force Base in Dayton, Ohio. The focus of my thesis research will be to conduct an author co-citation analysis on team cognition literature. My initial literature review has identified you as an important contributor to this area of inquiry. Because of your expertise I would like to ask for your assistance in my research efforts.

Specifically, would you please respond to my email address below with a listing of authors that you feel have made a significant contribution to the study of team cognition? Additionally, a listing of any articles, manuscripts, journals, books, and other published works impacting this research topic would also be very helpful. Please include all necessary reference information.

Thank you for taking the time to assist in this endeavor and I am sincerely grateful to receive your guidance. If you have any questions please contact me at ryan.howell@afit.edu or by phone 937-654-7068.

Sincerely,

\\Signed\\

RYAN A. HOWELL, Capt, USAF

Appendix C. *Co-Citation Counts (All-inclusive)*

	Amazeen PG	Artman H	Baker DP	Bandura A	Bell BS	Blickensderfer E	Bowers CA	Brehmer B	Burke CS	Cannon-Bowers JA	Clark A	Converse SA	Cooke NJ	Dumville BC	Edmondson AC	Endsley MR	Entin EE	Espinosa JA	Fiore SM
Amazeen PG	4.5	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Artman H	0	21.5	11	0	0	1	4	6	1	6	1	1	3	1	1	15	2	0	1
Baker DP	0	11	112	48	3	13	35	6	12	25	1	3	8	1	4	36	7	1	2
Bandura A	0	0	48	455	26	8	41	38	8	31	82	6	6	7	23	11	10	1	0
Bell BS	0	0	3	26	76.5	2	10	3	7	13	0	0	0	2	5	0	1	2	0
Blickensderfer E	0	1	13	8	2	49.5	27	3	13	23	1	2	6	4	6	9	8	1	1
Bowers CA	0	4	35	41	10	27	137	7	26	37	6	4	9	3	7	22	10	2	4
Brehmer B	0	6	6	38	3	3	7	62	2	7	0	4	4	2	1	20	1	0	1
Burke CS	0	1	12	8	7	13	26	2	67	29	0	1	6	8	10	6	8	2	4
Cannon-Bowers JA	0	6	25	31	13	23	37	7	29	211	0	3	33	21	15	16	14	2	7
Clark A	5	1	1	82	0	1	6	0	0	0	119	0	1	1	2	0	0	0	0
Converse SA	0	1	3	6	0	2	4	4	1	3	0	24.5	9	2	2	8	0	0	0
Cooke NJ	0	3	8	6	0	6	9	4	6	33	1	9	60	10	4	16	5	3	5
Dumville BC	0	1	1	7	2	4	3	2	8	21	1	2	10	52	5	3	2	1	1
Edmondson AC	0	1	4	23	5	6	7	1	10	15	2	2	4	5	50.5	3	1	2	0
Endsley MR	0	15	36	11	0	9	22	20	6	16	0	8	16	3	3	100	9	2	4
Entin EE	0	2	7	10	1	8	10	1	8	14	0	0	5	2	1	9	23.5	1	3
Espinosa JA	0	0	1	1	2	1	2	0	2	2	0	0	3	1	2	2	1	15.5	2
Fiore SM	0	1	2	0	0	1	4	1	4	7	0	0	5	1	0	4	3	2	25.5

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Amazeen PG	Artman H	Baker DP	Bandura A	Bell BS	Blickensderfer E	Bowers CA	Brehmer B	Burke CS	Cannon-Bowers JA	Clark A	Converse SA	Cooke NJ	Dumville BC	Edmondson AC	Endsley MR	Entin EE	Espinosa JA	Fiore SM
Fowlkes JE	0	1	20	2	3	10	20	0	9	29	1	3	4	1	3	10	3	1	1
Goodwin B	2	0	0	6	0	0	2	1	0	0	18	0	0	0	0	1	0	21	0
Goodwin GF	0	1	11	17	7	14	20	4	24	93	0	1	14	19	13	8	8	2	3
Gramopadhye AK	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0
Greenberg S	0	0	2	14	0	0	2	2	0	1	22	0	2	0	0	3	0	0	0
Gully SM	0	0	7	185	27	4	19	9	10	28	1	1	5	5	10	3	2	1	2
Gutwin C	0	1	4	4	2	0	1	1	1	3	0	0	2	1	1	11	2	2	1
Heffner TS	0	2	9	19	6	16	22	5	21	93	0	4	19	19	12	8	8	2	3
Hinsz VB	0	1	7	74	7	11	12	8	8	20	3	2	8	6	15	4	5	1	4
Hollingshead AB	0	0	15	299	13	6	8	11	9	19	38	3	4	17	13	2	2	2	4
Hutchins E	1	7	8	34	1	5	5	15	3	12	118	7	10	4	13	23	1	0	1
Ilgen DR	0	1	22	327	22	14	36	36	25	43	8	0	8	10	25	7	9	2	1
Jentsch F	0	1	21	10	3	12	43	2	7	16	1	3	8	3	1	14	7	1	2
Jundt D	0	1	3	4	4	1	4	0	5	11	1	0	3	2	4	1	1	0	0
Klein G	0	11	21	86	0	9	20	44	5	24	13	7	37	4	6	79	6	3	5
Klein KJ	0	0	3	114	14	0	6	5	6	22	0	0	1	6	30	1	2	0	0
Klimoski RJ	0	1	12	65	3	2	6	14	6	19	0	2	7	8	6	1	3	0	0
Kozlowski SWJ	0	0	24	160	71	18	38	10	30	57	6	0	8	14	25	7	8	3	1
Kraiger K	0	2	14	70	9	2	29	3	13	43	2	8	15	8	4	7	3	0	5
Kraut RE	0	1	4	55	6	1	2	3	0	2	5	0	0	1	4	5	0	6	1
Fowlkes JE	0	1	20	2	3	10	20	0	9	29	1	3	4	1	3	10	3	1	1

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Amazeen PG	Artman H	Baker DP	Bandura A	Bell BS	Blickensderfer E	Bowers CA	Brehmer B	Burke CS	Cannon-Bowers JA	Clark A	Converse SA	Cooke NJ	Dumville BC	Edmondson AC	Endsley MR	Entin EE	Espinosa JA	Fiore SM
Langfield-Smith K	0	1	1	2	0	1	2	2	2	5	0	1	3	2	2	1	0	0	0
Lant TK	0	0	0	22	0	0	0	6	0	1	1	0	0	0	8	0	0	0	0
Levine EL	0	1	8	25	1	1	6	1	2	4	0	1	2	0	2	1	1	0	0
Levine JM	2	1	8	115	2	9	17	30	9	18	11	2	3	7	27	3	2	1	2
Markman AB	1	0	0	19	1	0	2	13	0	2	22	0	6	0	1	1	0	0	2
Marks MA	0	1	11	48	16	15	22	4	35	50	0	2	11	17	16	5	9	4	2
Mathieu J	0	1	21	263	40	26	45	9	32	118	9	6	18	21	32	11	10	4	5
McNeese M	0	2	1	4	0	1	3	0	1	1	2	1	5	0	0	4	1	0	1
Menon S	0	0	0	13	0	0	0	0	0	2	7	0	0	0	0	1	0	0	0
Milanovich DM	0	4	15	6	4	17	28	4	21	51	1	2	14	15	6	8	7	1	4
Millward LJ	0	1	1	18	1	3	1	0	2	9	0	1	3	3	3	1	0	0	0
Mohammed S	0	2	11	41	9	16	21	7	21	54	4	6	21	46	19	8	3	2	5
Morris NM	0	1	7	39	1	10	10	20	4	17	28	6	14	5	3	17	3	0	2
Ocasio W	0	0	0	16	0	0	0	0	0	0	1	0	0	0	9	1	0	0	0
Oser RL	0	1	21	4	2	12	30	0	13	17	1	3	3	1	1	12	6	1	0
Prince C	0	10	68	9	4	19	53	7	16	26	2	5	9	2	5	43	9	1	12
Rentsch JR	0	2	4	30	1	5	14	4	7	24	2	4	14	10	8	3	4	2	2
Rouse WB	0	3	6	17	1	17	17	42	6	26	1	11	24	7	5	44	6	0	4
Ryan AM	0	0	14	126	11	0	2	1	1	4	8	0	0	2	1	1	0	0	0
Salas E	0	17	107	223	42	43	159	32	63	210	6	23	49	32	39	77	20	4	19

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Amazeen PG	Artman H	Baker DP	Bandura A	Bell BS	Blickensderfer E	Bowers CA	Brehmer B	Burke CS	Cannon-Bowers JA	Clark A	Converse SA	Cooke NJ	Dumville BC	Edmondson AC	Endsley MR	Entin EE	Espinosa JA	Fiore SM
Schooler JW	0	0	0	23	1	0	0	12	0	0	12	0	2	1	0	0	0	0	20
Seifert CM	0	1	0	5	0	1	1	2	0	0	1	1	2	0	2	1	0	0	3
Shapira Z	0	0	2	51	0	1	0	26	1	0	1	0	1	0	4	2	0	0	0
Spector PE	0	0	17	250	7	19	24	5	9	18	28	4	7	3	9	5	5	1	2
Stout RJ	0	3	39	11	5	29	61	5	26	76	2	8	34	17	9	25	13	2	5
Tannenbaum SI	0	0	18	128	8	13	34	2	10	41	3	15	8	2	6	7	3	1	2
Vollrath DA	0	0	6	44	6	10	12	6	7	17	0	1	6	6	16	5	4	1	3
Volpe CE	0	0	12	5	1	19	21	2	8	11	1	2	4	2	1	5	5	0	0
Weaver JL	0	1	1	8	4	2	26	3	1	4	1	1	1	0	0	2	2	0	0
Wegner DM	2	0	1	284	9	9	8	15	7	24	26	2	9	26	15	2	1	1	1
Woehr DJ	0	0	12	10	0	1	3	0	1	2	1	0	0	0	0	0	1	0	0
Zaccaro SJ	0	0	14	146	20	16	25	3	36	52	1	1	9	15	18	4	9	3	1
Zedeck S	0	0	7	79	1	0	6	11	1	1	0	1	1	0	0	2	0	1	0

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Fowlkes JE	Goodwin B	Goodwin GF	Gramopadhye AK	Greenberg S	Gully SM	Gutwin C	Heffner TS	Hinsz VB	Hollingshead AB	Hutchins E	Ilgen DR	Jentsch F	Jundt D	Klein G	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K
Amazeen PG	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Artman H	1	0	1	0	0	0	1	2	1	0	7	1	1	1	11	0	1	0	2
Baker DP	20	0	11	0	2	7	4	9	7	15	8	22	21	3	21	3	12	24	14
Bandura A	2	6	17	1	14	185	4	19	74	299	34	327	10	4	86	114	65	160	70
Bell BS	3	0	7	0	0	27	2	6	7	13	1	22	3	4	0	14	3	71	9
Blickensderfer E	10	0	14	0	0	4	0	16	11	6	5	14	12	1	9	0	2	18	2
Bowers CA	20	2	20	1	2	19	1	22	12	8	5	36	43	4	20	6	6	38	29
Brehmer B	0	1	4	0	2	9	1	5	8	11	15	36	2	0	44	5	14	10	3
Burke CS	9	0	24	0	0	10	1	21	8	9	3	25	7	5	5	6	6	30	13
Cannon-Bowers JA	29	0	93	0	1	28	3	93	20	19	12	43	16	11	24	22	19	57	43
Clark A	1	18	0	0	22	1	0	0	3	38	118	8	1	1	13	0	0	6	2
Converse SA	3	0	1	0	0	1	0	4	2	3	7	0	3	0	7	0	2	0	8
Cooke NJ	4	0	14	0	2	5	2	19	8	4	10	8	8	3	37	1	7	8	15
Dumville BC	1	0	19	0	0	5	1	19	6	17	4	10	3	2	4	6	8	14	8
Edmondson AC	3	0	13	0	0	10	1	12	15	13	13	25	1	4	6	30	6	25	4
Endsley MR	10	1	8	2	3	3	11	8	4	2	23	7	14	1	79	1	1	7	7
Entin EE	3	0	8	0	0	2	2	8	5	2	1	9	7	1	6	2	3	8	3
Espinosa JA	1	21	2	0	0	1	2	2	1	2	0	2	1	0	3	0	0	3	0
Fiore SM	1	0	3	0	0	2	1	3	4	4	1	1	2	0	5	0	0	1	5

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Fowlkes JE	Goodwin B	Goodwin GF	Gramopadhye AK	Greenberg S	Gully SM	Gutwin C	Heffner TS	Hinsz VB	Hollingshead AB	Hutchins E	Ilgen DR	Jentsch F	Jundt D	Klein G	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K
Fowlkes JE	51.5	0	3	0	0	2	0	3	3	1	0	9	9	2	5	0	1	8	13
Goodwin B	0	36	0	0	0	0	0	0	0	1	3	1	0	0	3	0	0	0	0
Goodwin GF	3	0	144	0	0	20	3	93	16	19	2	35	6	8	8	22	14	39	20
Gramopadhye AK	0	0	0	6	1	0	0	0	0	0	3	0	0	0	1	0	0	0	0
Greenberg S	0	0	0	1	28.5	0	18	1	1	12	11	4	0	0	15	2	2	2	0
Gully SM	2	0	20	0	0	234	0	21	16	10	2	64	5	6	3	37	15	104	31
Gutwin C	0	0	3	0	18	0	20.5	2	0	5	4	2	1	0	5	1	0	3	1
Heffner TS	3	0	93	0	1	21	2	149	16	18	3	33	6	6	11	19	15	39	25
Hinsz VB	3	0	16	0	1	16	0	16	174	63	20	43	5	6	12	18	11	25	7
Hollingshead AB	1	1	19	0	12	10	5	18	63	248	23	49	5	6	19	19	9	31	5
Hutchins E	0	3	2	3	11	2	4	3	20	23	117	15	5	1	66	10	2	5	3
Ilgen DR	9	1	35	0	4	64	2	33	43	49	15	320	13	33	22	64	83	150	78
Jentsch F	9	0	6	0	0	5	1	6	5	5	5	13	66	1	9	2	3	12	15
Jundt D	2	0	8	0	0	6	0	6	6	6	1	33	1	32.5	0	7	2	16	1
Klein G	5	3	8	1	15	3	5	11	12	19	66	22	9	0	143	11	2	13	9
Klein KJ	0	0	22	0	2	37	1	19	18	19	10	64	2	7	11	171	12	132	10
Klimoski RJ	1	0	14	0	2	15	0	15	11	9	2	83	3	2	2	12	104	35	31
Kozlowski SWJ	8	0	39	0	2	104	3	39	25	31	5	150	12	16	13	132	35	277	50
Kraiger K	13	0	20	0	0	31	1	25	7	5	3	78	15	1	9	10	31	50	172
Kraut RE	0	0	0	0	17	1	8	0	9	41	30	10	0	0	4	17	2	6	0

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Fowlkes JE	Goodwin B	Goodwin GF	Gramopadhye AK	Greenberg S	Gully SM	Gutwin C	Heffner TS	Hinsz VB	Hollingshead AB	Hutchins E	Ilgen DR	Jentsch F	Jundt D	Klein G	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K
Langfield-Smith K	0	0	2	0	0	2	0	3	1	0	0	2	0	0	5	2	0	3	2
Lant TK	0	0	2	0	0	4	0	2	3	7	15	13	0	0	1	10	1	4	1
Levine EL	3	17	3	0	0	5	0	3	1	1	1	35	1	0	2	4	24	17	17
Levine JM	1	2	16	0	8	23	2	16	72	79	32	62	2	6	7	22	14	54	10
Markman AB	0	1	2	0	2	3	0	2	0	1	10	0	0	0	11	2	0	1	2
Marks MA	4	0	46	0	0	37	2	45	16	19	6	54	6	15	6	26	16	74	20
Mathieu J	9	0	97	0	9	147	3	105	34	31	7	163	19	16	11	95	59	208	85
McNeese M	1	0	1	0	2	1	0	2	0	2	7	1	2	0	13	0	0	1	2
Menon S	0	22	1	0	3	2	0	1	0	1	0	5	0	1	2	8	1	6	0
Milanovich DM	19	0	24	1	1	6	0	26	10	8	4	22	15	7	8	5	10	20	19
Millward LJ	1	0	5	0	0	1	0	6	2	2	0	1	0	1	1	0	1	4	3
Mohammed S	2	0	51	0	0	25	2	54	29	40	17	39	5	5	11	24	19	49	30
Morris NM	3	0	11	3	1	4	2	13	11	21	16	8	4	1	24	3	4	7	22
Ocasio W	0	1	0	0	0	0	0	0	2	2	4	2	0	0	4	3	0	3	1
Oser RL	23	13	4	0	0	5	0	5	4	2	0	10	13	1	9	1	0	12	13
Prince C	26	19	11	0	2	8	4	11	8	5	10	20	29	4	23	2	4	19	19
Rentsch JR	2	0	20	0	1	6	0	46	15	12	4	25	4	5	5	32	33	38	18
Rouse WB	5	0	15	6	5	5	3	19	12	6	40	10	7	1	71	5	6	12	32
Ryan AM	0	0	4	0	0	26	0	4	4	5	1	50	2	1	2	25	17	38	17
Salas E	42	0	97	1	6	135	12	99	48	53	41	120	60	15	121	61	48	186	181

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Fowlkes JE	Goodwin B	Goodwin GF	Gramopadhye AK	Greenberg S	Gully SM	Gutwin C	Heffner TS	Hinsz VB	Hollingshead AB	Hutchins E	Ilgen DR	Jentsch F	Jundt D	Klein G	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K
Schooler JW	0	0	0	0	3	1	0	0	3	4	6	2	0	0	16	2	0	1	0
Seifert CM	0	0	0	0	1	0	0	0	0	1	13	1	1	0	5	0	0	1	0
Shapira Z	0	2	0	0	0	0	0	0	4	1	7	28	1	1	14	5	3	3	1
Spector PE	6	29	11	0	3	34	0	16	10	12	2	143	9	3	16	62	29	94	29
Stout RJ	32	0	32	0	1	10	2	35	15	10	12	32	27	7	23	4	10	32	35
Tannenbaum SI	14	0	10	0	2	39	2	9	8	5	3	46	14	4	15	24	32	84	77
Vollrath DA	2	0	15	0	0	12	0	15	201	49	16	35	5	5	8	22	11	24	5
Volpe CE	7	0	7	0	0	4	0	9	6	2	2	12	7	1	8	2	0	11	9
Weaver JL	0	7	3	1	1	6	0	4	2	3	0	4	2	0	5	3	0	8	7
Wegner DM	0	1	20	0	8	12	2	22	68	118	49	34	3	3	22	14	12	24	10
Woehr DJ	1	0	1	0	0	1	0	1	4	1	0	45	0	0	1	2	14	25	19
Zaccaro SJ	3	1	49	0	2	81	2	52	26	35	9	85	5	14	6	59	20	110	24
Zedeck S	1	0	0	0	2	4	0	1	3	1	0	140	2	1	4	15	59	30	42

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Kraut RE	Langfield-Smith K	Lant TK	Levine EL	Levine JM	Markman AB	Marks MA	Mathieu J	McNeese M	Menon S	Milanovich DM	Millward LJ	Mohammed S	Morris NM	Ocasio W	Oser RL	Prince C	Rentsch JR	Rouse WB
Amazeen PG	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Artman H	1	1	0	1	1	0	1	1	2	0	4	1	2	1	0	1	10	2	3
Baker DP	4	1	0	8	8	0	11	21	1	0	15	1	11	7	0	21	68	4	6
Bandura A	55	2	22	25	115	19	48	263	4	13	6	18	41	39	16	4	9	30	17
Bell BS	6	0	0	1	2	1	16	40	0	0	4	1	9	1	0	2	4	1	1
Blickensderfer E	1	1	0	1	9	0	15	26	1	0	17	3	16	10	0	12	19	5	17
Bowers CA	2	2	0	6	17	2	22	45	3	0	28	1	21	10	0	30	53	14	17
Brehmer B	3	2	6	1	30	13	4	9	0	0	4	0	7	20	0	0	7	4	42
Burke CS	0	2	0	2	9	0	35	32	1	0	21	2	21	4	0	13	16	7	6
Cannon-Bowers JA	2	5	1	4	18	2	50	118	1	2	51	9	54	17	0	17	26	24	26
Clark A	5	0	1	0	11	22	0	9	2	7	1	0	4	28	1	1	2	2	1
Converse SA	0	1	0	1	2	0	2	6	1	0	2	1	6	6	0	3	5	4	11
Cooke NJ	0	3	0	2	3	6	11	18	5	0	14	3	21	14	0	3	9	14	24
Dumville BC	1	2	0	0	7	0	17	21	0	0	15	3	46	5	0	1	2	10	7
Edmondson AC	4	2	8	2	27	1	16	32	0	0	6	3	19	3	9	1	5	8	5
Endsley MR	5	1	0	1	3	1	5	11	4	1	8	1	8	17	1	12	43	3	44
Entin EE	0	0	0	1	2	0	9	10	1	0	7	0	3	3	0	6	9	4	6
Espinosa JA	6	0	0	0	1	0	4	4	0	0	1	0	2	0	0	1	1	2	0
Fiore SM	1	0	0	0	2	2	2	5	1	0	4	0	5	2	0	0	12	2	4

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Kraut RE	Langfield-Smith K	Lant TK	Levine EL	Levine JM	Markman AB	Marks MA	Mathieu J	McNeese M	Menon S	Milanovich DM	Millward LJ	Mohammed S	Morris NM	Ocasio W	Oser RL	Prince C	Rentsch JR	Rouse WB
Fowlkes JE	0	0	0	3	1	0	4	9	1	0	19	1	2	3	0	23	26	2	5
Goodwin B	0	0	0	17	2	1	0	0	0	22	0	0	0	0	1	13	19	0	0
Goodwin GF	0	2	2	3	16	2	46	97	1	1	24	5	51	11	0	4	11	20	15
Gramopadhye AK	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	6
Greenberg S	17	0	0	0	8	2	0	9	2	3	1	0	0	1	0	0	2	1	5
Gully SM	1	2	4	5	23	3	37	147	1	2	6	1	25	4	0	5	8	6	5
Gutwin C	8	0	0	0	2	0	2	3	0	0	0	0	2	2	0	0	4	0	3
Heffner TS	0	3	2	3	16	2	45	105	2	1	26	6	54	13	0	5	11	46	19
Hinsz VB	9	1	3	1	72	0	16	34	0	0	10	2	29	11	2	4	8	15	12
Hollingshead AB	41	0	7	1	79	1	19	31	2	1	8	2	40	21	2	2	5	12	6
Hutchins E	30	0	15	1	32	10	6	7	7	0	4	0	17	16	4	0	10	4	40
Ilgen DR	10	2	13	35	62	0	54	163	1	5	22	1	39	8	2	10	20	25	10
Jentsch F	0	0	0	1	2	0	6	19	2	0	15	0	5	4	0	13	29	4	7
Jundt D	0	0	0	0	6	0	15	16	0	1	7	1	5	1	0	1	4	5	1
Klein G	4	5	1	2	7	11	6	11	13	2	8	1	11	24	4	9	23	5	71
Klein KJ	17	2	10	4	22	2	26	95	0	8	5	0	24	3	3	1	2	32	5
Klimoski RJ	2	0	1	24	14	0	16	59	0	1	10	1	19	4	0	0	4	33	6
Kozlowski SWJ	6	3	4	17	54	1	74	208	1	6	20	4	49	7	3	12	19	38	12
Kraiger K	0	2	1	17	10	2	20	85	2	0	19	3	30	22	1	13	19	18	32
Kraut RE	65.5	0	1	0	11	1	1	5	1	0	1	0	6	1	1	0	4	1	1

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Kraut RE	Langfield-Smith K	Lant TK	Levine EL	Levine JM	Markman AB	Marks MA	Mathieu J	McNeese M	Menon S	Milanovich DM	Millward LJ	Mohammed S	Morris NM	Ocasio W	Oser RL	Prince C	Rentsch JR	Rouse WB
Langfield-Smith K	0	10.5	1	0	2	0	3	2	0	0	2	1	4	3	0	1	2	1	3
Lant TK	1	1	55.5	1	5	0	0	10	0	0	0	0	5	0	43	0	0	1	0
Levine EL	0	0	1	87.5	2	0	1	19	1	22	0	0	4	3	0	3	4	4	3
Levine JM	11	2	5	2	137	4	21	42	2	3	10	3	38	16	2	0	6	22	26
Markman AB	1	0	0	0	4	35	1	4	1	3	0	1	0	2	0	1	0	0	3
Marks MA	1	3	0	1	21	1	196	122	1	1	24	3	41	8	0	4	13	14	10
Mathieu J	5	2	10	19	42	4	122	425	2	6	34	12	76	13	3	9	24	67	20
McNeese M	1	0	0	1	2	1	1	2	14.5	0	0	0	2	2	0	1	1	2	3
Menon S	0	0	0	22	3	3	1	6	0	45.5	0	0	0	0	0	0	0	1	0
Milanovich DM	1	2	0	0	10	0	24	34	0	0	92.5	5	23	9	0	11	29	12	14
Millward LJ	0	1	0	0	3	1	3	12	0	0	5	20.5	7	6	0	1	1	3	5
Mohammed S	6	4	5	4	38	0	41	76	2	0	23	7	116	27	0	3	7	33	31
Morris NM	1	3	0	3	16	2	8	13	2	0	9	6	27	150	0	1	10	10	215
Ocasio W	1	0	43	0	2	0	0	3	0	0	0	0	0	0	37.5	0	0	0	0
Oser RL	0	1	0	3	0	1	4	9	1	0	11	1	3	1	0	78.5	34	1	4
Prince C	4	2	0	4	6	0	13	24	1	0	29	1	7	10	0	34	128	4	10
Rentsch JR	1	1	1	4	22	0	14	67	2	1	12	3	33	10	0	1	4	78.5	15
Rouse WB	1	3	0	3	26	3	10	20	3	0	14	5	31	215	0	4	10	15	187
Ryan AM	3	0	2	15	4	3	6	57	0	8	0	0	10	0	1	1	1	9	0
Salas E	13	7	6	27	80	6	83	349	9	2	70	11	101	45	2	49	126	44	88

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Kraut RE	Langfield-Smith K	Lant TK	Levine EL	Levine JM	Markman AB	Marks MA	Mathieu J	McNeese M	Menon S	Milanovich DM	Millward LJ	Mohammed S	Morris NM	Ocasio W	Oser RL	Prince C	Rentsch JR	Rouse WB
Schooler JW	7	0	0	0	10	18	0	0	0	0	0	0	1	1	0	0	0	0	1
Seifert CM	2	0	0	0	1	17	2	2	0	0	1	0	2	1	0	0	0	0	4
Shapira Z	4	0	46	1	2	5	0	3	0	0	0	0	3	0	16	0	1	1	1
Spector PE	0	1	6	104	11	0	17	237	0	47	11	8	13	8	5	10	15	36	10
Stout RJ	2	5	0	4	14	0	29	45	1	0	64	6	38	18	0	28	61	17	27
Tannenbaum SI	2	1	1	15	13	3	16	212	1	0	9	4	14	15	2	21	27	9	20
Vollrath DA	5	1	7	0	60	0	13	31	1	1	9	2	26	9	3	4	7	12	11
Volpe CE	0	1	0	1	2	0	9	13	0	0	10	1	8	5	0	11	15	1	8
Weaver JL	2	0	0	1	2	0	6	11	1	0	2	0	4	6	0	0	6	1	4
Wegner DM	35	2	10	1	77	29	17	32	1	0	11	4	52	13	3	2	5	8	18
Woehr DJ	0	0	0	5	0	1	3	13	0	1	2	2	2	0	0	1	3	2	0
Zaccaro SJ	5	2	1	8	52	1	186	173	1	3	23	2	46	7	0	4	13	25	10
Zedeck S	6	0	1	35	3	2	3	25	1	1	1	0	1	2	0	0	2	2	3

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Volpe CE	Weaver JL	Wegner DM	Woehr DJ	Zaccaro SJ	Zedeck S
Amazeen PG	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Artman H	0	17	0	1	0	0	3	0	0	0	1	0	0	0	0
Baker DP	14	107	0	0	2	17	39	18	6	12	1	1	12	14	7
Bandura A	126	223	23	5	51	250	11	128	44	5	8	284	10	146	79
Bell BS	11	42	1	0	0	7	5	8	6	1	4	9	0	20	1
Blickensderfer E	0	43	0	1	1	19	29	13	10	19	2	9	1	16	0
Bowers CA	2	159	0	1	0	24	61	34	12	21	26	8	3	25	6
Brehmer B	1	32	12	2	26	5	5	2	6	2	3	15	0	3	11
Burke CS	1	63	0	0	1	9	26	10	7	8	1	7	1	36	1
Cannon-Bowers JA	4	210	0	0	0	18	76	41	17	11	4	24	2	52	1
Clark A	8	6	12	1	1	28	2	3	0	1	1	26	1	1	0
Converse SA	0	23	0	1	0	4	8	15	1	2	1	2	0	1	1
Cooke NJ	0	49	2	2	1	7	34	8	6	4	1	9	0	9	1
Dumville BC	2	32	1	0	0	3	17	2	6	2	0	26	0	15	0
Edmondson AC	1	39	0	2	4	9	9	6	16	1	0	15	0	18	0
Endsley MR	1	77	0	1	2	5	25	7	5	5	2	2	0	4	2
Entin EE	0	20	0	0	0	5	13	3	4	5	2	1	1	9	0
Espinosa JA	0	4	0	0	0	1	2	1	1	0	0	1	0	3	1
Fiore SM	0	19	20	3	0	2	5	2	3	0	0	1	0	1	0

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Volpe CE	Weaver JL	Wegner DM	Woehr DJ	Zaccaro SJ	Zedeck S
Fowlkes JE	0	42	0	0	0	6	32	14	2	7	0	0	1	3	1
Goodwin B	0	0	0	0	2	29	0	0	0	0	7	1	0	1	0
Goodwin GF	4	97	0	0	0	11	32	10	15	7	3	20	1	49	0
Gramopadhye AK	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Greenberg S	0	6	3	1	0	3	1	2	0	0	1	8	0	2	2
Gully SM	26	135	1	0	0	34	10	39	12	4	6	12	1	81	4
Gutwin C	0	12	0	0	0	0	2	2	0	0	0	2	0	2	0
Heffner TS	4	99	0	0	0	16	35	9	15	9	4	22	1	52	1
Hinsz VB	4	48	3	0	4	10	15	8	201	6	2	68	4	26	3
Hollingshead AB	5	53	4	1	1	12	10	5	49	2	3	118	1	35	1
Hutchins E	1	41	6	13	7	2	12	3	16	2	0	49	0	9	0
Ilgen DR	50	120	2	1	28	143	32	46	35	12	4	34	45	85	140
Jentsch F	2	60	0	1	1	9	27	14	5	7	2	3	0	5	2
Jundt D	1	15	0	0	1	3	7	4	5	1	0	3	0	14	1
Klein G	2	121	16	5	14	16	23	15	8	8	5	22	1	6	4
Klein KJ	25	61	2	0	5	62	4	24	22	2	3	14	2	59	15
Klimoski RJ	17	48	0	0	3	29	10	32	11	0	0	12	14	20	59
Kozlowski SWJ	38	186	1	1	3	94	32	84	24	11	8	24	25	110	30
Kraiger K	17	181	0	0	1	29	35	77	5	9	7	10	19	24	42
Kraut RE	3	13	7	2	4	0	2	2	5	0	2	35	0	5	6

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Volpe CE	Weaver JL	Wegner DM	Woehr DJ	Zaccaro SJ	Zedeck S
Langfield-Smith K	0	7	0	0	0	1	5	1	1	1	0	2	0	2	0
Lant TK	2	6	0	0	46	6	0	1	7	0	0	10	0	1	1
Levine EL	15	27	0	0	1	104	4	15	0	1	1	1	5	8	35
Levine JM	4	80	10	1	2	11	14	13	60	2	2	77	0	52	3
Markman AB	3	6	18	17	5	0	0	3	0	0	0	29	1	1	2
Marks MA	6	83	0	2	0	17	29	16	13	9	6	17	3	186	3
Mathieu J	57	349	0	2	3	237	45	212	31	13	11	32	13	173	25
McNeese M	0	9	0	0	0	0	1	1	1	0	1	1	0	1	1
Menon S	8	2	0	0	0	47	0	0	1	0	0	0	1	3	1
Milanovich DM	0	70	0	1	0	11	64	9	9	10	2	11	2	23	1
Millward LJ	0	11	0	0	0	8	6	4	2	1	0	4	2	2	0
Mohammed S	10	101	1	2	3	13	38	14	26	8	4	52	2	46	1
Morris NM	0	45	1	1	0	8	18	15	9	5	6	13	0	7	2
Ocasio W	1	2	0	0	16	5	0	2	3	0	0	3	0	0	0
Oser RL	1	49	0	0	0	10	28	21	4	11	0	2	1	4	0
Prince C	1	126	0	0	1	15	61	27	7	15	6	5	3	13	2
Rentsch JR	9	44	0	0	1	36	17	9	12	1	1	8	2	25	2
Rouse WB	0	88	1	4	1	10	27	20	11	8	4	18	0	10	3
Ryan AM	130	26	0	0	0	77	0	16	3	0	0	6	21	15	38
Salas E	26	415	6	2	5	93	134	257	41	33	25	60	10	125	24

Appendix C. (Cont.)

Co-Citation Counts (All-inclusive)

	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Volpe CE	Weaver JL	Wegner DM	Woehr DJ	Zaccaro SJ	Zedeck S
Schooler JW	0	6	60.5	19	2	3	0	0	1	0	0	78	2	0	0
Seifert CM	0	2	19	24.5	0	0	2	1	0	0	0	11	0	2	0
Shapira Z	0	5	2	0	62.5	5	1	0	2	1	0	3	0	0	15
Spector PE	77	93	3	0	5	315	20	39	26	32	5	11	25	57	69
Stout RJ	0	134	0	2	1	20	137	26	13	19	7	14	2	30	2
Tannenbaum SI	16	257	0	1	0	39	26	299	9	12	12	6	2	22	11
Vollrath DA	3	41	1	0	2	26	13	9	159	6	2	57	6	22	4
Volpe CE	0	33	0	0	1	32	19	12	6	43	5	5	0	10	0
Weaver JL	0	25	0	0	0	5	7	12	2	5	31.5	2	0	8	1
Wegner DM	6	60	78	11	3	11	14	6	57	5	2	240	2	22	5
Woehr DJ	21	10	2	0	0	25	2	2	6	0	0	2	51.5	5	33
Zaccaro SJ	15	125	0	2	0	57	30	22	22	10	8	22	5	253	8
Zedeck S	38	24	0	0	15	69	2	11	4	0	1	5	33	8	144

Appendix D. *Co-citation Correlation Matrix (All-inclusive)*

	Amazeen PG	*Artman H*	*Baker DP*	*Bandura A*	*Bell BS*	*Blickensderfer E*	*Bowers CA*	*Brehmer B*	*Burke CS*	*Cannon-Bowers JA*	*Clark A*	*Converse SA*	*Cooke NJ*
Amazeen PG	1.000												
Artman H	-0.097	1.000											
Baker DP	-0.161	0.591	1.000										
Bandura A	0.034	-0.067	0.291	1.000									
Bell BS	-0.123	-0.013	0.265	0.479	1.000								
Blickensderfer E	-0.167	0.273	0.564	0.221	0.299	1.000							
Bowers CA	-0.143	0.402	0.731	0.289	0.378	0.745	1.000						
Brehmer B	-0.038	0.320	0.238	0.416	0.123	0.160	0.212	1.000					
Burke CS	-0.173	0.218	0.497	0.261	0.460	0.693	0.683	0.089	1.000				
Cannon-Bowers JA	-0.150	0.322	0.509	0.274	0.424	0.673	0.653	0.158	0.734	1.000			
Clark A	0.513	-0.006	0.007	0.364	0.000	-0.083	-0.038	0.168	-0.134	-0.092	1.000		
Converse SA	-0.133	0.382	0.437	0.159	0.089	0.400	0.491	0.304	0.293	0.421	0.043	1.000	
Cooke NJ	-0.154	0.428	0.408	0.087	0.125	0.513	0.484	0.293	0.456	0.666	-0.057	0.602	1.000
Dumville BC	-0.072	0.094	0.191	0.270	0.282	0.419	0.310	0.100	0.526	0.598	-0.035	0.257	0.491
Edmondson AC	-0.058	0.065	0.284	0.538	0.485	0.414	0.390	0.246	0.539	0.532	0.084	0.208	0.275
Endsley MR	-0.134	0.767	0.620	0.031	0.037	0.403	0.492	0.489	0.266	0.341	-0.005	0.536	0.576
Entin EE	-0.223	0.365	0.595	0.228	0.299	0.726	0.683	0.181	0.687	0.682	-0.098	0.322	0.540
Espinosa JA	0.093	-0.017	0.026	0.012	0.106	0.050	0.070	-0.073	0.121	0.103	-0.040	-0.030	0.082
Fiore SM	-0.133	0.305	0.338	0.019	0.072	0.284	0.377	0.130	0.317	0.381	-0.084	0.268	0.394
Fowlkes JE	-0.158	0.375	0.667	0.019	0.172	0.617	0.682	0.019	0.521	0.586	-0.144	0.406	0.429
Goodwin B	0.287	-0.064	-0.002	0.036	-0.131	-0.086	-0.042	-0.119	-0.160	-0.178	0.261	-0.110	-0.180
Goodwin GF	-0.137	0.142	0.312	0.264	0.392	0.561	0.462	0.094	0.686	0.859	-0.108	0.235	0.502
Gramopadhye AK	-0.050	0.149	0.012	-0.065	-0.094	0.049	0.051	0.302	-0.077	-0.027	0.188	0.218	0.147
Greenberg S	0.283	0.047	0.042	0.328	0.016	-0.077	-0.007	0.231	-0.105	-0.032	0.576	0.025	0.031

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Amazeen PG	*Artman H*	*Baker DP*	*Bandura A*	*Bell BS*	*Blickensderfer E*	*Bowers CA*	*Brehmer B*	*Burke CS*	*Cannon-Bowers JA*	*Clark A*	*Converse SA*	*Cooke NJ*
Gully SM	-0.110	0.007	0.334	0.700	0.644	0.304	0.416	0.259	0.424	0.448	0.124	0.203	0.183
Gutwin C	-0.103	0.311	0.305	0.112	0.125	0.112	0.207	0.165	0.141	0.213	0.082	0.196	0.220
Heffner TS	-0.141	0.148	0.296	0.264	0.374	0.567	0.462	0.099	0.661	0.850	-0.105	0.275	0.538
Hinsz VB	0.004	-0.052	0.096	0.393	0.181	0.201	0.131	0.211	0.155	0.167	0.104	0.052	0.093
Hollingshead AB	0.075	-0.079	0.198	0.755	0.253	0.086	0.124	0.340	0.100	0.121	0.461	0.084	0.024
Hutchins E	0.489	0.257	0.085	0.237	-0.033	0.042	0.055	0.373	-0.031	0.045	0.812	0.213	0.206
Ilgen DR	-0.118	-0.068	0.317	0.829	0.495	0.257	0.334	0.415	0.347	0.318	0.204	0.101	0.095
Jentsch F	-0.154	0.391	0.693	0.161	0.248	0.645	0.846	0.129	0.520	0.530	-0.068	0.451	0.454
Jundt D	-0.117	0.024	0.235	0.416	0.468	0.355	0.336	0.141	0.542	0.482	-0.072	0.041	0.221
Klein G	-0.055	0.587	0.485	0.320	0.109	0.318	0.426	0.707	0.208	0.336	0.302	0.545	0.604
Klein KJ	-0.119	-0.093	0.199	0.662	0.609	0.214	0.250	0.204	0.340	0.344	0.116	0.057	0.077
Klimoski RJ	-0.140	-0.023	0.285	0.619	0.367	0.212	0.289	0.329	0.321	0.363	0.042	0.177	0.172
Kozlowski SWJ	-0.134	0.001	0.377	0.701	0.806	0.430	0.483	0.235	0.569	0.546	0.051	0.195	0.220
Kraiger K	-0.146	0.215	0.509	0.485	0.443	0.437	0.639	0.254	0.539	0.639	-0.006	0.537	0.455
Kraut RE	0.059	-0.028	0.105	0.551	0.173	-0.059	0.014	0.245	-0.053	-0.012	0.461	0.016	-0.074
Langfield-Smith K	-0.147	0.300	0.334	0.151	0.209	0.458	0.438	0.301	0.486	0.574	-0.111	0.383	0.604
Lant TK	-0.037	-0.118	-0.060	0.244	0.026	-0.117	-0.081	0.213	-0.092	-0.056	0.140	-0.084	-0.134
Levine EL	-0.089	-0.052	0.170	0.405	0.139	0.118	0.155	0.062	0.086	0.091	0.066	0.082	0.004
Levine JM	0.114	0.000	0.244	0.716	0.364	0.289	0.297	0.493	0.320	0.314	0.291	0.175	0.151
Markman AB	0.393	-0.024	-0.066	0.284	-0.019	-0.139	-0.065	0.345	-0.155	-0.061	0.507	0.004	0.041
Marks MA	-0.127	0.004	0.235	0.385	0.496	0.448	0.361	0.070	0.686	0.547	-0.055	0.117	0.272
Mathieu J	-0.142	0.058	0.417	0.711	0.633	0.514	0.543	0.210	0.592	0.666	0.080	0.358	0.332
McNeese M	-0.019	0.442	0.268	0.133	0.032	0.179	0.298	0.338	0.141	0.216	0.242	0.384	0.502
Menon S	0.065	-0.144	-0.026	0.265	0.033	-0.037	-0.046	-0.049	-0.082	-0.061	0.181	-0.089	-0.128

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Amazeen PG	*Artman H*	*Baker DP*	*Bandura A*	*Bell BS*	*Blickensderfer E*	*Bowers CA*	*Brehmer B*	*Burke CS*	*Cannon-Bowers JA*	*Clark A*	*Converse SA*	*Cooke NJ*
Milanovich DM	-0.159	0.313	0.508	0.119	0.266	0.711	0.657	0.085	0.707	0.758	-0.136	0.349	0.592
Millward LJ	-0.121	0.067	0.294	0.445	0.289	0.423	0.341	0.194	0.362	0.528	0.131	0.321	0.376
Mohammed S	-0.092	0.131	0.338	0.468	0.457	0.573	0.493	0.248	0.663	0.747	0.023	0.369	0.554
Morris NM	-0.008	0.111	0.093	0.088	-0.006	0.230	0.135	0.472	0.061	0.148	0.150	0.374	0.337
Ocasio W	-0.044	-0.110	-0.061	0.142	-0.019	-0.138	-0.094	0.085	-0.132	-0.104	0.091	-0.081	-0.137
Oser RL	-0.117	0.314	0.614	0.044	0.152	0.554	0.666	0.006	0.468	0.418	-0.114	0.365	0.301
Prince C	-0.124	0.596	0.868	0.091	0.194	0.632	0.789	0.150	0.530	0.516	-0.087	0.473	0.448
Rentsch JR	-0.134	0.039	0.242	0.460	0.404	0.424	0.384	0.175	0.481	0.583	0.000	0.268	0.410
Rouse WB	-0.077	0.249	0.162	0.046	0.005	0.294	0.218	0.526	0.128	0.235	0.094	0.458	0.456
Ryan AM	-0.088	-0.122	0.240	0.699	0.381	0.068	0.148	0.184	0.098	0.123	0.244	0.036	-0.043
Salas E	-0.167	0.316	0.646	0.562	0.560	0.662	0.770	0.310	0.683	0.803	0.025	0.560	0.557
Schooler JW	0.237	-0.063	-0.087	0.306	-0.026	-0.114	-0.095	0.255	-0.137	-0.090	0.264	-0.056	-0.024
Seifert CM	0.093	0.004	-0.103	0.061	-0.073	-0.100	-0.097	0.179	-0.131	-0.096	0.287	0.014	0.026
Shapira Z	-0.071	-0.051	0.042	0.357	0.029	-0.116	-0.033	0.518	-0.103	-0.088	0.178	-0.048	-0.091
Spector PE	-0.084	-0.090	0.261	0.730	0.388	0.276	0.275	0.195	0.231	0.249	0.234	0.120	0.063
Stout RJ	-0.169	0.414	0.678	0.128	0.268	0.788	0.808	0.137	0.711	0.785	-0.118	0.510	0.706
Tannenbaum SI	-0.113	0.160	0.472	0.513	0.458	0.450	0.584	0.190	0.451	0.563	0.045	0.571	0.332
Vollrath DA	-0.012	-0.056	0.070	0.335	0.159	0.203	0.115	0.160	0.145	0.153	0.053	0.039	0.083
Volpe CE	-0.166	0.222	0.542	0.240	0.230	0.796	0.686	0.099	0.549	0.498	-0.063	0.375	0.390
Weaver JL	-0.098	0.199	0.393	0.275	0.360	0.460	0.744	0.167	0.425	0.430	-0.015	0.364	0.283
Wegner DM	0.152	-0.077	0.134	0.706	0.206	0.086	0.105	0.376	0.067	0.125	0.457	0.091	0.064
Woehr DJ	-0.116	-0.079	0.212	0.410	0.252	0.071	0.129	0.112	0.134	0.090	-0.013	-0.049	-0.042
Zaccaro SJ	-0.116	-0.023	0.290	0.596	0.573	0.432	0.393	0.164	0.641	0.531	0.053	0.134	0.232
Zedeck S	-0.111	-0.104	0.152	0.549	0.197	0.010	0.113	0.296	0.070	0.044	0.080	-0.006	-0.053

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Dumville BC	*Edmondson AC*	*Endsley MR*	*Entin EE*	*Espinosa JA*	*Fiore SM*	*Fowlkes JE*	*Goodwin B*	*Goodwin GF*	*Gramopadhye AK*	*Greenberg S*	*Gully SM*	*Gutwin C*
Amazeen PG													
Artman H													
Baker DP													
Bandura A													
Bell BS													
Blickensderfer E													
Bowers CA													
Brehmer B													
Burke CS													
Cannon-Bowers JA													
Clark A													
Converse SA													
Cooke NJ													
Dumville BC	1.000												
Edmondson AC	0.465	1.000											
Endsley MR	0.113	0.109	1.000										
Entin EE	0.352	0.353	0.478	1.000									
Espinosa JA	0.066	0.068	0.041	0.070	1.000								
Fiore SM	0.200	0.110	0.340	0.340	0.051	1.000							
Fowlkes JE	0.184	0.167	0.436	0.556	0.020	0.310	1.000						
Goodwin B	-0.215	-0.173	-0.049	-0.120	0.521	-0.080	-0.025	1.000					
Goodwin GF	0.638	0.544	0.172	0.567	0.108	0.253	0.303	-0.189	1.000				
Gramopadhye AK	-0.062	-0.071	0.345	0.023	-0.111	0.003	-0.022	-0.086	-0.074	1.000			
Greenberg S	-0.032	0.071	0.153	-0.065	-0.004	-0.030	-0.123	0.052	-0.056	0.134	1.000		

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Dumville BC	*Edmondson AC*	*Endsley MR*	*Entin EE*	*Espinosa JA*	*Fiore SM*	*Fowlkes JE*	*Goodwin B*	*Goodwin GF*	*Gramopadhye AK*	*Greenberg S*	*Gully SM*	*Gutwin C*
Gully SM	0.276	0.529	0.083	0.349	0.057	0.105	0.143	-0.077	0.420	-0.049	0.092	1.000	
Gutwin C	0.104	0.115	0.448	0.214	0.098	0.151	0.118	-0.122	0.149	0.141	0.682	0.097	1.000
Heffner TS	0.638	0.527	0.173	0.561	0.106	0.250	0.294	-0.186	0.941	-0.065	-0.049	0.419	0.129
Hinsz VB	0.227	0.440	-0.004	0.165	-0.015	0.080	-0.010	-0.125	0.189	-0.053	0.075	0.232	-0.003
Hollingshead AB	0.268	0.390	-0.016	0.134	0.008	0.003	-0.068	-0.032	0.140	-0.006	0.397	0.404	0.156
Hutchins E	0.083	0.196	0.325	-0.002	-0.057	0.037	-0.048	0.070	-0.022	0.295	0.596	0.022	0.188
Ilgen DR	0.214	0.527	0.010	0.333	0.007	-0.019	0.092	0.003	0.320	-0.081	0.143	0.673	0.042
Jentsch F	0.227	0.231	0.497	0.624	0.036	0.347	0.647	-0.057	0.332	0.025	-0.049	0.261	0.184
Jundt D	0.349	0.529	0.026	0.387	0.056	0.067	0.216	-0.160	0.502	-0.126	-0.051	0.423	0.032
Klein G	0.154	0.239	0.828	0.386	0.016	0.302	0.255	-0.044	0.161	0.380	0.356	0.244	0.387
Klein KJ	0.261	0.687	-0.020	0.261	0.034	-0.020	0.017	-0.044	0.384	-0.086	0.106	0.659	0.062
Klimoski RJ	0.275	0.415	0.001	0.280	-0.015	0.006	0.102	-0.080	0.352	-0.102	0.049	0.512	0.007
Kozlowski SWJ	0.368	0.683	0.082	0.436	0.080	0.094	0.216	-0.081	0.524	-0.102	0.062	0.799	0.113
Kraiger K	0.358	0.423	0.281	0.458	0.020	0.305	0.457	-0.110	0.477	0.018	0.008	0.559	0.163
Kraut RE	0.103	0.265	0.009	-0.036	0.089	-0.025	-0.129	-0.061	-0.025	0.044	0.595	0.230	0.365
Langfield-Smith K	0.468	0.392	0.376	0.410	0.007	0.218	0.327	-0.185	0.463	0.058	-0.056	0.277	0.100
Lant TK	-0.039	0.241	-0.105	-0.123	-0.114	-0.136	-0.153	-0.060	-0.034	-0.049	0.008	0.127	-0.077
Levine EL	-0.020	0.110	-0.026	0.083	0.023	-0.042	0.066	0.487	0.058	-0.085	-0.028	0.229	-0.071
Levine JM	0.379	0.679	0.059	0.251	0.010	0.098	0.024	-0.124	0.319	0.012	0.274	0.500	0.136
Markman AB	-0.004	0.007	0.012	-0.150	-0.117	0.108	-0.167	0.020	-0.074	0.005	0.332	0.093	-0.029
Marks MA	0.472	0.535	0.050	0.481	0.147	0.100	0.161	-0.149	0.621	-0.092	-0.030	0.541	0.081
Mathieu J	0.415	0.637	0.136	0.494	0.092	0.183	0.275	-0.019	0.635	-0.079	0.091	0.803	0.142
McNeese M	0.092	0.113	0.553	0.232	-0.004	0.199	0.143	-0.096	0.113	0.206	0.301	0.125	0.242
Menon S	-0.110	0.008	-0.113	-0.069	0.144	-0.128	-0.102	0.717	-0.051	-0.089	0.062	0.120	-0.098

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Dumville BC	*Edmondson AC*	*Endsley MR*	*Entin EE*	*Espinosa JA*	*Fiore SM*	*Fowlkes JE*	*Goodwin B*	*Goodwin GF*	*Gramopadhye AK*	*Greenberg S*	*Gully SM*	*Gutwin C*
Milanovich DM	0.540	0.367	0.323	0.655	0.055	0.346	0.682	-0.153	0.605	0.013	-0.103	0.251	0.102
Millward LJ	0.421	0.414	0.128	0.362	-0.008	0.116	0.221	-0.070	0.475	0.055	0.048	0.455	0.067
Mohammed S	0.868	0.683	0.191	0.483	0.078	0.261	0.249	-0.234	0.780	-0.003	0.023	0.506	0.152
Morris NM	0.129	0.064	0.342	0.156	-0.086	0.104	0.066	-0.079	0.103	0.656	0.106	0.057	0.098
Ocasio W	-0.112	0.182	-0.078	-0.128	-0.087	-0.134	-0.136	-0.024	-0.101	-0.047	-0.004	0.065	-0.076
Oser RL	0.104	0.109	0.409	0.508	0.103	0.239	0.769	0.173	0.210	-0.043	-0.113	0.151	0.095
Prince C	0.182	0.214	0.652	0.608	0.106	0.464	0.760	0.112	0.300	0.025	-0.034	0.204	0.275
Rentsch JR	0.516	0.583	0.074	0.418	0.060	0.137	0.153	-0.099	0.633	-0.057	0.016	0.475	0.037
Rouse WB	0.162	0.097	0.488	0.218	-0.065	0.169	0.139	-0.132	0.154	0.626	0.071	0.050	0.166
Ryan AM	0.057	0.272	-0.060	0.121	-0.044	-0.089	-0.032	0.104	0.128	-0.074	0.111	0.570	-0.021
Salas E	0.457	0.586	0.433	0.641	0.073	0.344	0.544	-0.118	0.654	0.022	0.088	0.699	0.238
Schooler JW	0.085	0.024	-0.036	-0.145	-0.076	0.340	-0.163	-0.045	-0.091	-0.045	0.239	0.016	-0.009
Seifert CM	-0.025	-0.015	0.016	-0.146	-0.105	0.266	-0.146	-0.112	-0.107	0.089	0.138	-0.038	-0.025
Shapira Z	-0.101	0.144	0.005	-0.046	-0.085	-0.133	-0.134	-0.023	-0.093	-0.028	0.089	0.194	-0.043
Spector PE	0.109	0.385	-0.004	0.259	0.038	-0.019	0.070	0.317	0.248	-0.073	0.138	0.584	-0.009
Stout RJ	0.491	0.363	0.496	0.731	0.064	0.410	0.790	-0.112	0.575	0.027	-0.081	0.265	0.187
Tannenbaum SI	0.248	0.433	0.247	0.399	0.054	0.242	0.395	-0.068	0.402	-0.006	0.093	0.598	0.185
Vollrath DA	0.206	0.416	-0.015	0.150	-0.020	0.076	-0.009	-0.102	0.178	-0.062	0.028	0.182	-0.028
Volpe CE	0.251	0.256	0.343	0.590	-0.003	0.221	0.561	0.070	0.373	-0.004	-0.090	0.261	0.064
Weaver JL	0.187	0.260	0.277	0.416	0.128	0.199	0.329	0.053	0.323	0.116	0.016	0.393	0.118
Wegner DM	0.320	0.378	-0.014	0.094	-0.030	0.080	-0.088	-0.060	0.134	0.014	0.350	0.377	0.100
Woehr DJ	0.012	0.150	-0.062	0.097	-0.054	-0.062	0.047	0.010	0.083	-0.127	-0.052	0.237	-0.075
Zaccaro SJ	0.433	0.620	0.041	0.476	0.126	0.082	0.134	-0.095	0.591	-0.088	0.056	0.722	0.097
Zedeck S	-0.018	0.172	-0.063	0.075	-0.053	-0.105	-0.012	0.063	0.036	-0.080	0.044	0.301	-0.053

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Heffner TS	*Hinsz VB*	*Hollingshead AB*	*Hutchins E*	*Ilgen DR*	*Jentsch F*	*Jundt D*	*Klein G*	*Klein KJ*	*Klimoski RJ*	*Kozlowski SWJ*	*Kraiger K*	*Kraut RE*
Gully SM													
Gutwin C													
Heffner TS	1.000												
Hinsz VB	0.182	1.000											
Hollingshead AB	0.133	0.512	1.000										
Hutchins E	-0.020	0.196	0.305	1.000									
Ilgen DR	0.315	0.303	0.533	0.044	1.000								
Jentsch F	0.328	0.065	0.037	0.035	0.198	1.000							
Jundt D	0.473	0.241	0.168	-0.036	0.566	0.223	1.000						
Klein G	0.171	0.131	0.299	0.552	0.245	0.363	0.042	1.000					
Klein KJ	0.378	0.262	0.387	0.034	0.694	0.120	0.471	0.166	1.000				
Klimoski RJ	0.367	0.209	0.304	-0.040	0.812	0.186	0.440	0.141	0.508	1.000			
Kozlowski SWJ	0.518	0.242	0.334	-0.005	0.769	0.320	0.612	0.205	0.872	0.630	1.000		
Kraiger K	0.489	0.124	0.179	0.025	0.581	0.522	0.375	0.351	0.396	0.615	0.631	1.000	
Kraut RE	-0.034	0.304	0.733	0.423	0.333	-0.041	0.023	0.267	0.319	0.157	0.187	0.056	1.000
Langfield-Smith K	0.479	0.113	0.074	0.096	0.174	0.312	0.248	0.419	0.227	0.139	0.324	0.388	-0.057
Lant TK	-0.040	0.105	0.202	0.133	0.206	-0.103	0.013	0.059	0.188	0.078	0.096	0.005	0.177
Levine EL	0.067	-0.016	0.054	-0.107	0.496	0.089	0.123	0.046	0.297	0.498	0.345	0.335	-0.022
Levine JM	0.315	0.708	0.763	0.334	0.583	0.142	0.391	0.308	0.499	0.415	0.535	0.338	0.520
Markman AB	-0.073	0.054	0.292	0.488	0.070	-0.105	-0.138	0.293	0.030	-0.017	-0.016	-0.013	0.291
Marks MA	0.611	0.175	0.189	-0.030	0.437	0.219	0.597	0.075	0.492	0.371	0.640	0.388	0.033
Mathieu J	0.644	0.224	0.320	0.002	0.724	0.385	0.538	0.262	0.726	0.649	0.889	0.718	0.149
McNeese M	0.140	0.037	0.136	0.452	0.063	0.271	-0.017	0.696	0.029	0.029	0.083	0.234	0.139
Menon S	-0.045	-0.040	0.060	-0.049	0.249	-0.083	-0.005	-0.024	0.253	0.137	0.178	0.022	-0.011

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Heffner TS	*Hinsz VB*	*Hollingshead AB*	*Hutchins E*	*Ilgen DR*	*Jentsch F*	*Jundt D*	*Klein G*	*Klein KJ*	*Klimoski RJ*	*Kozlowski SWJ*	*Kraiger K*	*Kraut RE*
Milanovich DM	0.607	0.117	0.036	-0.010	0.205	0.593	0.423	0.230	0.164	0.241	0.359	0.488	-0.084
Millward LJ	0.496	0.210	0.408	0.034	0.438	0.221	0.226	0.282	0.365	0.346	0.446	0.441	0.175
Mohammed S	0.789	0.379	0.381	0.150	0.428	0.333	0.486	0.274	0.472	0.439	0.610	0.563	0.179
Morris NM	0.120	0.070	0.131	0.287	0.039	0.097	-0.019	0.417	0.011	0.035	0.035	0.211	0.030
Ocasio W	-0.105	0.042	0.152	0.078	0.113	-0.109	-0.079	0.047	0.116	-0.002	0.026	-0.034	0.109
Oser RL	0.204	-0.006	-0.055	-0.054	0.083	0.624	0.141	0.246	0.026	0.062	0.206	0.395	-0.113
Prince C	0.290	0.029	-0.017	0.060	0.121	0.767	0.212	0.424	0.056	0.122	0.258	0.471	-0.044
Rentsch JR	0.737	0.258	0.241	-0.004	0.516	0.252	0.454	0.151	0.630	0.615	0.668	0.506	0.064
Rouse WB	0.174	0.054	0.035	0.288	0.004	0.179	-0.003	0.530	-0.003	0.029	0.049	0.268	-0.021
Ryan AM	0.133	0.135	0.412	-0.012	0.737	0.066	0.214	0.145	0.585	0.572	0.575	0.385	0.271
Salas E	0.655	0.217	0.281	0.102	0.563	0.628	0.460	0.474	0.531	0.532	0.762	0.825	0.120
Schooler JW	-0.090	0.152	0.322	0.306	0.038	-0.115	-0.109	0.190	0.005	-0.034	-0.046	-0.068	0.374
Seifert CM	-0.107	-0.014	0.090	0.314	-0.059	-0.090	-0.119	0.199	-0.056	-0.105	-0.092	-0.089	0.205
Shapira Z	-0.097	0.089	0.322	0.131	0.438	-0.069	0.045	0.255	0.218	0.252	0.135	0.077	0.262
Spector PE	0.267	0.161	0.356	-0.007	0.790	0.170	0.318	0.179	0.652	0.613	0.673	0.450	0.189
Stout RJ	0.579	0.106	0.024	0.049	0.199	0.729	0.371	0.373	0.141	0.224	0.368	0.573	-0.078
Tannenbaum SI	0.401	0.132	0.206	0.035	0.484	0.466	0.319	0.334	0.459	0.518	0.665	0.768	0.107
Vollrath DA	0.171	0.974	0.419	0.158	0.254	0.059	0.226	0.086	0.243	0.178	0.219	0.098	0.231
Volpe CE	0.383	0.102	0.012	-0.017	0.270	0.579	0.263	0.280	0.202	0.185	0.377	0.455	-0.100
Weaver JL	0.329	0.081	0.112	0.008	0.253	0.499	0.210	0.293	0.252	0.201	0.420	0.504	0.036
Wegner DM	0.133	0.525	0.871	0.372	0.472	0.014	0.101	0.331	0.337	0.276	0.282	0.174	0.706
Woehr DJ	0.080	0.081	0.058	-0.112	0.642	0.075	0.320	-0.020	0.330	0.613	0.448	0.424	-0.003
Zaccaro SJ	0.588	0.258	0.366	0.010	0.625	0.224	0.597	0.150	0.665	0.486	0.776	0.462	0.174
Zedeck S	0.035	0.080	0.212	-0.060	0.806	0.050	0.309	0.082	0.380	0.783	0.425	0.445	0.155

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Langfield-Smith K	*Lant TK*	*Levine EL*	*Levine JM*	*Markman AB*	*Marks MA*	*Mathieu J*	*McNeese M*	*Menon S*	*Milanovich DM*	*Millward LJ*	*Mohammed S*	*Morris NM*
Langfield-Smith K	1.000												
Lant TK	-0.056	1.000											
Levine EL	-0.022	0.014	1.000										
Levine JM	0.251	0.172	0.076	1.000									
Markman AB	-0.035	0.066	-0.088	0.223	1.000								
Marks MA	0.344	-0.023	0.082	0.379	-0.072	1.000							
Mathieu J	0.343	0.096	0.425	0.479	0.014	0.664	1.000						
McNeese M	0.244	-0.053	-0.028	0.152	0.145	0.048	0.135	1.000					
Menon S	-0.112	-0.004	0.728	0.017	0.012	-0.004	0.237	-0.096	1.000				
Milanovich DM	0.505	-0.130	0.025	0.208	-0.149	0.439	0.431	0.112	-0.115	1.000			
Millward LJ	0.376	0.030	0.184	0.398	0.077	0.334	0.589	0.103	0.101	0.413	1.000		
Mohammed S	0.545	0.028	0.070	0.600	0.005	0.611	0.658	0.185	-0.073	0.583	0.554	1.000	
Morris NM	0.279	-0.062	-0.020	0.189	0.065	0.029	0.075	0.201	-0.067	0.128	0.275	0.254	1.000
Ocasio W	-0.066	0.925	0.004	0.079	0.019	-0.070	0.037	-0.047	0.014	-0.154	0.024	-0.070	-0.060
Oser RL	0.266	-0.142	0.087	0.014	-0.133	0.118	0.248	0.146	-0.044	0.479	0.142	0.174	0.017
Prince C	0.366	-0.130	0.082	0.104	-0.122	0.195	0.319	0.248	-0.075	0.612	0.188	0.284	0.091

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Langfield-Smith K	*Lant TK*	*Levine EL*	*Levine JM*	*Markman AB*	*Marks MA*	*Mathieu J*	*McNeese M*	*Menon S*	*Milanovich DM*	*Millward LJ*	*Mohammed S*	*Morris NM*
Rentsch JR	0.339	0.022	0.278	0.451	-0.084	0.506	0.726	0.115	0.135	0.429	0.494	0.714	0.141
Rouse WB	0.371	-0.081	-0.026	0.166	0.045	0.048	0.099	0.321	-0.102	0.198	0.259	0.293	0.929
Ryan AM	0.010	0.140	0.515	0.328	0.110	0.227	0.593	-0.002	0.398	0.000	0.369	0.216	-0.004
Salas E	0.501	0.000	0.239	0.461	0.011	0.557	0.869	0.306	0.013	0.615	0.563	0.696	0.203
Schooler JW	-0.029	0.049	-0.077	0.290	0.751	-0.085	-0.045	0.046	-0.037	-0.125	0.036	0.052	-0.001
Seifert CM	-0.080	-0.016	-0.124	0.081	0.745	-0.051	-0.075	0.094	-0.090	-0.110	-0.037	-0.033	0.043
Shapira Z	-0.021	0.811	0.098	0.221	0.200	-0.034	0.118	0.030	0.034	-0.139	0.108	-0.023	-0.010
Spector PE	0.084	0.144	0.763	0.347	0.047	0.335	0.764	0.027	0.614	0.133	0.482	0.295	0.025
Stout RJ	0.577	-0.138	0.064	0.205	-0.137	0.386	0.447	0.228	-0.116	0.891	0.400	0.584	0.181
Tannenbaum SI	0.284	0.044	0.271	0.331	0.043	0.366	0.815	0.205	0.051	0.360	0.466	0.456	0.130
Vollrath DA	0.098	0.088	0.015	0.645	0.005	0.154	0.205	0.000	-0.011	0.111	0.170	0.348	0.053
Volpe CE	0.359	-0.105	0.304	0.149	-0.144	0.314	0.475	0.125	0.135	0.552	0.312	0.377	0.127
Weaver JL	0.277	-0.076	0.128	0.226	-0.049	0.333	0.478	0.221	0.008	0.360	0.239	0.362	0.156
Wegner DM	0.112	0.211	0.026	0.749	0.540	0.149	0.290	0.130	0.028	0.037	0.420	0.402	0.127
Woehr DJ	-0.020	0.008	0.477	0.140	-0.088	0.156	0.355	-0.078	0.203	0.060	0.106	0.114	-0.070
Zaccaro SJ	0.324	0.054	0.203	0.536	-0.010	0.946	0.791	0.076	0.108	0.388	0.431	0.631	0.040
Zedeck S	-0.031	0.119	0.613	0.222	-0.003	0.116	0.379	-0.024	0.260	-0.001	0.143	0.090	-0.022

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Ocasio W	*Oser RL*	*Prince C*	*Rentsch JR*	*Rouse WB*	*Ryan AM*	*Salas E*	*Schooler JW*	*Seifert CM*	*Shapira Z*
Ocasio W	1.000									
Oser RL	-0.121	1.000								
Prince C	-0.123	0.736	1.000							
Rentsch JR	-0.048	0.096	0.170	1.000						
Rouse WB	-0.084	0.084	0.191	0.161	1.000					
Ryan AM	0.113	-0.010	-0.001	0.379	-0.064	1.000				
Salas E	-0.038	0.481	0.608	0.614	0.272	0.374	1.000			
Schooler JW	0.012	-0.136	-0.113	-0.090	-0.004	0.033	-0.043	1.000		
Seifert CM	-0.040	-0.137	-0.109	-0.121	0.057	-0.054	-0.070	0.667	1.000	
Shapira Z	0.668	-0.119	-0.095	0.006	-0.031	0.294	0.042	0.101	0.018	1.000
Spector PE	0.108	0.091	0.104	0.541	-0.012	0.792	0.509	0.000	-0.074	0.265
Stout RJ	-0.154	0.636	0.783	0.406	0.275	0.001	0.709	-0.132	-0.100	-0.132
Tannenbaum SI	0.026	0.391	0.437	0.458	0.177	0.386	0.861	-0.040	-0.042	0.069
Vollrath DA	0.037	-0.003	0.026	0.252	0.043	0.102	0.187	0.111	-0.039	0.048
Volpe CE	-0.109	0.562	0.597	0.314	0.190	0.144	0.570	-0.115	-0.132	-0.083
Weaver JL	-0.080	0.345	0.465	0.281	0.213	0.128	0.603	-0.079	-0.097	-0.043
Wegner DM	0.152	-0.073	-0.037	0.207	0.058	0.375	0.265	0.661	0.326	0.317
Woehr DJ	-0.038	0.038	0.059	0.246	-0.080	0.559	0.222	-0.065	-0.115	0.138
Zaccaro SJ	-0.004	0.110	0.186	0.589	0.038	0.426	0.640	-0.038	-0.044	0.085
Zedeck S	0.043	-0.016	-0.005	0.244	-0.049	0.633	0.223	-0.019	-0.086	0.378

Appendix D. (Cont.)

Co-citation Correlation Matrix (All-inclusive)

	Spector PE	*Stout RJ*	*Tannenbaum SI*	*Vollrath DA*	*Volpe CE*	*Weaver JL*	*Wegner DM*	*Woehr DJ*	*Zaccaro SJ*	*Zedeck S*
Spector PE	1.000									
Stout RJ	0.140	1.000								
Tannenbaum SI	0.494	0.453	1.000							
Vollrath DA	0.150	0.099	0.110	1.000						
Volpe CE	0.397	0.657	0.427	0.124	1.000					
Weaver JL	0.246	0.479	0.532	0.069	0.492	1.000				
Wegner DM	0.314	0.025	0.195	0.437	0.010	0.084	1.000			
Woehr DJ	0.512	0.059	0.205	0.090	0.151	0.052	0.029	1.000		
Zaccaro SJ	0.535	0.349	0.463	0.223	0.329	0.369	0.309	0.233	1.000	
Zedeck S	0.623	0.000	0.240	0.064	0.111	0.064	0.180	0.792	0.245	1.000

Appendix E. *Co-citation Counts (1990-1995)*

	Baker DP	Bandura A	Bowers CA	Brehmer B	Clark A	Converse SA	Cooke NJ	Endsley MR	Greenberg S	Gully SM	Hinsz VB	Hollingshead AB	Hutchins E	Ilgen DR	Klein G
Baker DP	67.5	0	6	6	1	3	1	23	0	1	0	0	8	4	8
Bandura A	0	44.5	2	1	3	0	0	0	0	5	10	1	1	14	2
Bowers CA	6	2	42	0	1	1	0	1	6	1	2	0	1	5	2
Brehmer B	6	1	0	22	0	1	1	13	1	0	0	2	8	3	19
Clark A	1	3	1	0	15	0	0	0	1	0	0	3	22	0	0
Converse SA	3	0	1	1	0	22.5	6	5	0	1	2	2	6	0	4
Cooke NJ	1	0	0	1	0	6	15	4	0	1	1	0	3	0	17
Endsley MR	23	0	1	13	0	5	4	42.5	1	0	0	1	17	0	22
Greenberg S	0	0	6	1	1	0	0	1	9	0	1	4	5	0	3
Gully SM	1	5	1	0	0	1	1	0	0	19.5	1	5	0	9	1
Hinsz VB	0	10	2	0	0	2	1	0	1	1	27	16	10	4	4
Hollingshead AB	0	1	0	2	3	2	0	1	4	5	16	35.5	13	12	0
Hutchins E	8	1	1	8	22	6	3	17	5	0	10	13	37	4	30
Ilgen DR	4	14	5	3	0	0	0	0	0	9	4	12	4	40	1
Klein G	8	2	2	19	0	4	17	22	3	1	4	0	30	1	38.5

Appendix E. (Cont.)

Co-citation Counts (1990-1995)

	Baker DP	Bandura A	Bowers CA	Brehmer B	Clark A	Converse SA	Cooke NJ	Endsley MR	Greenberg S	Gully SM	Hinsz VB	Hollingshead AB	Hutchins E	Ilgen DR	Klein G
Klein KJ	0	4	1	1	0	0	0	0	0	13	0	4	1	8	0
Klimoski RJ	0	0	0	0	0	1	0	0	0	0	1	1	1	7	0
Kozlowski SWJ	1	10	1	1	0	0	0	1	0	7	0	2	0	14	3
Kraiger K	2	15	11	0	1	3	1	2	0	3	1	1	2	8	3
Kraut RE	4	0	0	0	0	0	0	3	7	0	1	22	20	0	1
Lant TK	0	4	0	3	0	0	0	0	0	2	0	1	9	5	0
Levine EL	2	1	4	0	0	0	0	1	0	0	0	0	0	4	0
Levine JM	3	2	6	3	3	2	0	0	1	11	14	27	22	21	0
Markman AB	0	0	0	3	4	0	1	0	1	0	0	0	3	1	2
Mathieu J	1	35	10	0	2	4	1	0	0	7	1	2	0	30	2
McNeese M	0	0	0	0	0	1	3	1	0	0	0	0	4	0	6
Mohammed S	3	7	7	0	0	7	3	3	0	7	5	11	11	5	3
Ocasio W	0	3	0	0	0	0	0	0	0	0	0	0	3	0	0
Prince C	51	1	26	6	1	5	2	26	0	4	0	1	9	4	10
Rentsch JR	1	4	5	0	0	4	1	1	0	1	3	3	4	3	2

Appendix E. (Cont.)

Co-citation Counts (1990-1995)

	Baker DP	Bandura A	Bowers CA	Brehmer B	Clark A	Converse SA	Cooke NJ	Endsley MR	Greenberg S	Gully SM	Hinsz VB	Hollingshead AB	Hutchins E	Ilgen DR	Klein G
Rouse WB	0	0	2	4	0	7	4	12	0	1	1	1	8	2	12
Ryan AM	1	1	1	0	0	0	0	0	0	1	2	0	1	11	0
Salas E	61	28	40	12	2	23	7	36	1	11	6	22	21	26	25
Schooler JW	0	4	0	1	4	0	2	0	0	0	1	1	3	1	5
Seifert CM	0	1	0	0	0	1	2	1	0	0	0	1	10	1	1
Shapira Z	1	2	0	0	0	0	0	0	0	0	0	0	4	1	5
Spector PE	0	9	1	1	4	0	2	0	1	1	0	0	0	24	2
Stout RJ	8	0	10	1	1	4	2	7	0	1	1	3	4	3	7
Tannenbaum SI	6	19	18	1	2	15	2	3	0	6	0	1	1	11	6
Vollrath DA	0	2	0	0	0	0	0	0	0	1	24	3	1	1	0
Wegner DM	0	15	0	0	3	0	0	0	0	1	5	10	9	2	1
Woehr DJ	1	1	2	0	0	0	0	0	0	0	2	0	0	16	0
Zaccaro SJ	1	26	3	0	0	0	0	0	2	15	0	0	0	19	1
Zedeck S	0	1	1	1	0	1	1	0	0	0	1	6	0	7	2

Appendix E. (Cont.)

Co-citation Counts (1990-1995)

	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K	Kraut RE	Lant TK	Levine EL	Levine JM	Markman AB	Mathieu J	McNeese M	Mohammed S	Ocasio W	Prince C	Rentsch JR
Baker DP	0	0	1	2	4	0	2	3	0	1	0	3	0	51	1
Bandura A	4	0	10	15	0	4	1	2	0	35	0	7	3	1	4
Bowers CA	1	0	1	11	0	0	4	6	0	10	0	7	0	26	5
Brehmer B	1	0	1	0	0	3	0	3	3	0	0	0	0	6	0
Clark A	0	0	0	1	0	0	0	3	4	2	0	0	0	1	0
Converse SA	0	1	0	3	0	0	0	2	0	4	1	7	0	5	4
Cooke NJ	0	0	0	1	0	0	0	0	1	1	3	3	0	2	1
Endsley MR	0	0	1	2	3	0	1	0	0	0	1	3	0	26	1
Greenberg S	0	0	0	0	7	0	0	1	1	0	0	0	0	0	0
Gully SM	13	0	7	3	0	2	0	11	0	7	0	7	0	4	1
Hinsz VB	0	1	0	1	1	0	0	14	0	1	0	5	0	0	3
Hollingshead AB	4	1	2	1	22	1	0	27	0	2	0	11	0	1	3
Hutchins E	1	1	0	2	20	9	0	22	3	0	4	11	3	9	4
Ilgen DR	8	7	14	8	0	5	4	21	1	30	0	5	0	4	3
Klein G	0	0	3	3	1	0	0	0	2	2	6	3	0	10	2

Appendix E. (Cont.)

Co-citation Counts (1990-1995)

	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K	Kraut RE	Lant TK	Levine EL	Levine JM	Markman AB	Mathieu J	McNeese M	Mohammed S	Ocasio W	Prince C	Rentsch JR
Klein KJ	34.5	1	31	4	2	4	0	10	0	21	0	9	0	0	12
Klimoski RJ	1	6.5	1	1	0	0	0	2	0	1	0	1	0	0	1
Kozlowski SWJ	31	1	53	6	0	3	2	13	0	45	0	7	2	1	7
Kraiger K	4	1	6	119	0	1	3	3	0	40	1	11	0	11	6
Kraut RE	2	0	0	0	24.5	1	0	4	0	1	0	0	0	4	0
Lant TK	4	0	3	1	1	27.5	0	1	0	6	0	5	18	0	1
Levine EL	0	0	2	3	0	0	10	0	0	5	0	0	0	3	1
Levine JM	10	2	13	3	4	1	0	45.5	0	7	1	19	0	5	13
Markman AB	0	0	0	0	0	0	0	0	7.5	0	1	0	0	0	0
Mathieu J	21	1	45	40	1	6	5	7	0	203	0	4	0	9	21
McNeese M	0	0	0	1	0	0	0	1	1	0	6.5	2	0	0	2
Mohammed S	9	1	7	11	0	5	0	19	0	4	2	40	0	4	21
Ocasio W	0	0	2	0	0	18	0	0	0	0	0	0	14	0	0
Prince C	0	0	1	11	4	0	3	5	0	9	0	4	0	88	2
Rentsch JR	12	1	7	6	0	1	1	13	0	21	2	21	0	2	32.5

Appendix E. (Cont.)

Co-citation Counts (1990-1995)

	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K	Kraut RE	Lant TK	Levine EL	Levine JM	Markman AB	Mathieu J	McNeese M	Mohammed S	Ocasio W	Prince C	Rentsch JR
Rouse WB	1	0	0	3	0	0	0	4	0	3	1	11	0	2	7
Ryan AM	1	4	5	3	0	1	1	0	0	11	0	3	0	1	3
Salas E	15	0	30	143	6	4	8	40	0	169	3	40	1	99	23
Schooler JW	0	0	0	0	0	0	0	7	8	0	0	0	0	0	0
Seifert CM	0	0	1	0	1	0	0	1	2	0	0	2	0	0	0
Shapira Z	0	0	0	0	0	28	0	0	2	2	0	0	7	1	0
Spector PE	2	2	14	2	0	3	6	0	0	53	0	1	2	0	6
Stout RJ	0	0	1	7	0	0	3	3	0	1	0	6	0	20	1
Tannenbaum SI	9	1	22	55	1	1	6	6	1	184	1	7	0	19	8
Vollrath DA	0	0	0	0	0	1	0	7	0	1	0	1	0	0	1
Wegner DM	1	0	0	0	1	2	0	24	2	0	0	17	0	0	5
Woehr DJ	0	2	4	5	0	0	1	0	1	2	0	0	0	3	0
Zaccaro SJ	2	2	3	1	0	1	1	10	0	16	0	5	0	2	7
Zedeck S	17	0	7	1	0	0	0	0	1	7	1	0	0	1	0

Appendix E. (Cont.)

Co-citation Counts (1990-1995)

	Rouse WB	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Wegner DM	Woehr DJ	Zaccaro SJ	Zedeck S
Baker DP	0	1	61	0	0	1	0	8	6	0	0	1	1	0
Bandura A	0	1	28	4	1	2	9	0	19	2	15	1	26	1
Bowers CA	2	1	40	0	0	0	1	10	18	0	0	2	3	1
Brehmer B	4	0	12	1	0	0	1	1	1	0	0	0	0	1
Clark A	0	0	2	4	0	0	4	1	2	0	3	0	0	0
Converse SA	7	0	23	0	1	0	0	4	15	0	0	0	0	1
Cooke NJ	4	0	7	2	2	0	2	2	2	0	0	0	0	1
Endsley MR	12	0	36	0	1	0	0	7	3	0	0	0	0	0
Greenberg S	0	0	1	0	0	0	1	0	0	0	0	0	2	0
Gully SM	1	1	11	0	0	0	1	1	6	1	1	0	15	0
Hinsz VB	1	2	6	1	0	0	0	1	0	24	5	2	0	1
Hollingshead AB	1	0	22	1	1	0	0	3	1	3	10	0	0	6
Hutchins E	8	1	21	3	10	4	0	4	1	1	9	0	0	0
Ilgen DR	2	11	26	1	1	1	24	3	11	1	2	16	19	7
Klein G	12	0	25	5	1	5	2	7	6	0	1	0	1	2

Appendix E. (Cont.)

Co-citation Counts (1990-1995)

	Rouse WB	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Wegner DM	Woehr DJ	Zaccaro SJ	Zedeck S
Klein KJ	1	1	15	0	0	0	2	0	9	0	1	0	2	17
Klimoski RJ	0	4	0	0	0	0	2	0	1	0	0	2	2	0
Kozlowski SWJ	0	5	30	0	1	0	14	1	22	0	0	4	3	7
Kraiger K	3	3	143	0	0	0	2	7	55	0	0	5	1	1
Kraut RE	0	0	6	0	1	0	0	0	1	0	1	0	0	0
Lant TK	0	1	4	0	0	28	3	0	1	1	2	0	1	0
Levine EL	0	1	8	0	0	0	6	3	6	0	0	1	1	0
Levine JM	4	0	40	7	1	0	0	3	6	7	24	0	10	0
Markman AB	0	0	0	8	2	2	0	0	1	0	2	1	0	1
Mathieu J	3	11	169	0	0	2	53	1	184	1	0	2	16	7
McNeese M	1	0	3	0	0	0	0	0	1	0	0	0	0	1
Mohammed S	11	3	40	0	2	0	1	6	7	1	17	0	5	0
Ocasio W	0	0	1	0	0	7	2	0	0	0	0	0	0	0
Prince C	2	1	99	0	0	1	0	20	19	0	0	3	2	1
Rentsch JR	7	3	23	0	0	0	6	1	8	1	5	0	7	0

Appendix E. (Cont.)

Co-citation Counts (1990-1995)

	Rouse WB	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Wegner DM	Woehr DJ	Zaccaro SJ	Zedeck S
Rouse WB	33	0	42	0	1	0	0	5	4	0	1	0	1	1
Ryan AM	0	17	10	0	0	0	12	0	6	0	2	5	3	5
Salas E	42	10	260	3	2	2	10	29	208	3	10	5	20	4
Schooler JW	0	0	3	29	14	0	2	0	0	1	36	1	0	0
Seifert CM	1	0	2	14	15	0	0	2	0	0	6	0	0	0
Shapira Z	0	0	2	0	0	20	0	0	0	1	0	0	0	0
Spector PE	0	12	10	2	0	0	45.5	0	6	0	3	3	11	5
Stout RJ	5	0	29	0	2	0	0	29.5	6	0	0	0	2	0
Tannenbaum SI	4	6	208	0	0	0	6	6	224	0	1	0	6	4
Vollrath DA	0	0	3	1	0	1	0	0	0	17	1	0	1	0
Wegner DM	1	2	10	36	6	0	3	0	1	1	38.5	2	2	1
Woehr DJ	0	5	5	1	0	0	3	0	0	0	2	13	0	4
Zaccaro SJ	1	3	20	0	0	0	11	2	6	1	2	0	32.5	1
Zedeck S	1	5	4	0	0	0	5	0	4	0	1	4	1	15.5

Appendix F. *Co-citation Correlation Matrix (1990-1995)*

	Baker DP	*Bandura A*	*Bowers CA*	*Brehmer B*	*Clark A*	*Converse SA*	*Cooke NJ*	*Endsley MR*	*Greenberg S*	*Gully SM*	*Hinsz VB*	*Hollingshead AB*	*Hutchins E*	*Ilgen DR*	*Klein G*
Baker DP	1.000														
Bandura A	0.056	1.000													
Bowers CA	0.546	0.264	1.000												
Brehmer B	0.432	-0.076	0.119	1.000											
Clark A	0.005	0.015	-0.038	0.074	1.000										
Converse SA	0.429	0.176	0.458	0.247	0.029	1.000									
Cooke NJ	0.177	-0.087	0.062	0.472	-0.042	0.458	1.000								
Endsley MR	0.778	-0.045	0.362	0.743	0.080	0.481	0.447	1.000							
Greenberg S	-0.038	-0.163	0.184	0.120	0.258	-0.091	-0.003	0.063	1.000						
Gully SM	0.094	0.459	0.208	-0.063	-0.124	0.135	-0.089	-0.037	-0.131	1.000					
Hinsz VB	-0.081	0.116	-0.045	-0.038	0.127	0.007	-0.057	-0.078	0.099	0.051	1.000				
Hollingshead AB	0.089	0.043	0.095	0.047	0.182	0.161	-0.094	0.051	0.347	0.280	0.564	1.000			
Hutchins E	0.277	-0.164	0.038	0.535	0.572	0.250	0.372	0.526	0.397	-0.096	0.250	0.498	1.000		
Ilgen DR	0.088	0.600	0.254	-0.037	-0.033	0.076	-0.168	-0.074	-0.139	0.573	0.077	0.278	-0.145	1.000	
Klein G	0.407	-0.057	0.171	0.822	0.258	0.416	0.749	0.773	0.176	-0.122	-0.004	0.005	0.642	-0.142	1.000

Appendix F. (Cont.)

Co-citation Correlation Matrix (1990-1995)

	Baker DP	*Bandura A*	*Bowers CA*	*Brehmer B*	*Clark A*	*Converse SA*	*Cooke NJ*	*Endsley MR*	*Greenberg S*	*Gully SM*	*Hinsz VB*	*Hollingshead AB*	*Hutchins E*	*Ilgen DR*	*Klein G*
Baker DP	1.000														
Bandura A	0.056	1.000													
Bowers CA	0.546	0.264	1.000												
Brehmer B	0.432	-0.076	0.119	1.000											
Clark A	0.005	0.015	-0.038	0.074	1.000										
Converse SA	0.429	0.176	0.458	0.247	0.029	1.000									
Cooke NJ	0.177	-0.087	0.062	0.472	-0.042	0.458	1.000								
Endsley MR	0.778	-0.045	0.362	0.743	0.080	0.481	0.447	1.000							
Greenberg S	-0.038	-0.163	0.184	0.120	0.258	-0.091	-0.003	0.063	1.000						
Gully SM	0.094	0.459	0.208	-0.063	-0.124	0.135	-0.089	-0.037	-0.131	1.000					
Hinsz VB	-0.081	0.116	-0.045	-0.038	0.127	0.007	-0.057	-0.078	0.099	0.051	1.000				
Hollingshead AB	0.089	0.043	0.095	0.047	0.182	0.161	-0.094	0.051	0.347	0.280	0.564	1.000			
Hutchins E	0.277	-0.164	0.038	0.535	0.572	0.250	0.372	0.526	0.397	-0.096	0.250	0.498	1.000		
Ilgen DR	0.088	0.600	0.254	-0.037	-0.033	0.076	-0.168	-0.074	-0.139	0.573	0.077	0.278	-0.145	1.000	
Klein G	0.407	-0.057	0.171	0.822	0.258	0.416	0.749	0.773	0.176	-0.122	-0.004	0.005	0.642	-0.142	1.000

Appendix F. (Cont.)

Co-citation Correlation Matrix (1990-1995)

	Baker DP	*Bandura A*	*Bowers CA*	*Brehmer B*	*Clark A*	*Converse SA*	*Cooke NJ*	*Endsley MR*	*Greenberg S*	*Gully SM*	*Hinsz VB*	*Hollingshead AB*	*Hutchins E*	*Ilgen DR*	*Klein G*
Klein KJ	-0.025	0.320	0.108	-0.092	-0.117	0.075	-0.133	-0.107	-0.187	0.603	-0.080	0.156	-0.177	0.433	-0.139
Klimoski RJ	-0.158	0.079	-0.097	-0.158	-0.062	-0.094	-0.199	-0.230	-0.134	0.185	0.043	0.101	-0.164	0.578	-0.235
Kozlowski SWJ	0.068	0.525	0.229	-0.032	-0.077	0.178	-0.069	-0.022	-0.198	0.515	-0.092	0.077	-0.175	0.616	-0.054
Kraiger K	0.392	0.509	0.614	0.129	-0.009	0.550	0.131	0.305	-0.093	0.272	-0.020	0.155	0.054	0.361	0.207
Kraut RE	0.146	-0.137	-0.010	0.112	0.388	0.057	-0.054	0.193	0.663	-0.034	0.244	0.696	0.573	-0.041	0.185
Lant TK	-0.097	0.066	-0.119	-0.032	0.034	-0.112	-0.166	-0.116	-0.113	-0.010	-0.099	-0.064	0.029	0.013	-0.048
Levine EL	0.348	0.378	0.587	0.014	-0.055	0.302	-0.027	0.190	-0.099	0.152	-0.169	-0.051	-0.188	0.494	0.029
Levine JM	0.204	0.248	0.292	0.087	0.227	0.277	-0.069	0.116	0.081	0.526	0.484	0.797	0.418	0.462	0.075
Markman AB	-0.150	-0.168	-0.216	0.155	0.418	-0.164	0.066	-0.081	0.025	-0.293	-0.148	-0.143	0.152	-0.259	0.143
Mathieu J	0.223	0.679	0.487	0.025	0.005	0.489	0.048	0.123	-0.134	0.354	-0.077	0.058	-0.106	0.581	0.080
McNeese M	0.094	-0.089	0.045	0.369	0.177	0.334	0.694	0.333	0.070	-0.090	0.012	0.027	0.469	-0.155	0.659
Mohammed S	0.278	0.301	0.428	0.080	0.041	0.523	0.132	0.242	-0.075	0.418	0.217	0.476	0.293	0.247	0.163
Ocasio W	-0.094	0.009	-0.136	-0.045	0.003	-0.135	-0.138	-0.110	-0.102	-0.110	-0.108	-0.131	0.006	-0.088	-0.089
Prince C	0.922	0.151	0.762	0.390	-0.004	0.527	0.195	0.745	-0.009	0.166	-0.076	0.116	0.241	0.155	0.404
Rentsch JR	0.130	0.418	0.364	-0.033	-0.038	0.396	0.041	0.074	-0.133	0.393	0.081	0.233	0.049	0.383	0.024

Appendix F. (Cont.)

Co-citation Correlation Matrix (1990-1995)

	Baker DP	*Bandura A*	*Bowers CA*	*Brehmer B*	*Clark A*	*Converse SA*	*Cooke NJ*	*Endsley MR*	*Greenberg S*	*Gully SM*	*Hinsz VB*	*Hollingshead AB*	*Hutchins E*	*Ilgen DR*	*Klein G*
Rouse WB	0.411	0.154	0.423	0.443	0.011	0.679	0.449	0.616	-0.023	0.148	0.025	0.217	0.391	0.124	0.572
Ryan AM	0.073	0.398	0.207	-0.099	-0.066	0.115	-0.106	-0.060	-0.199	0.209	-0.085	-0.002	-0.245	0.720	-0.117
Salas E	0.528	0.548	0.698	0.190	-0.001	0.653	0.149	0.417	-0.109	0.336	-0.051	0.143	0.078	0.426	0.259
Schooler JW	-0.103	0.077	-0.142	-0.038	0.185	-0.134	0.012	-0.106	-0.099	-0.135	0.042	0.070	0.114	-0.135	-0.023
Seifert CM	-0.061	-0.066	-0.130	0.007	0.359	0.004	0.102	0.025	0.017	-0.172	0.005	0.062	0.282	-0.176	0.167
Shapira Z	-0.040	-0.028	-0.105	0.053	-0.016	-0.103	-0.032	-0.041	-0.080	-0.110	-0.096	-0.127	0.092	-0.098	0.031
Spector PE	-0.079	0.538	0.061	-0.113	0.022	-0.040	-0.078	-0.154	-0.135	0.205	-0.135	-0.097	-0.265	0.724	-0.140
Stout RJ	0.662	0.084	0.706	0.306	-0.009	0.537	0.266	0.609	-0.014	0.133	-0.046	0.139	0.235	0.099	0.404
Tannenbaum SI	0.314	0.601	0.576	0.083	0.005	0.607	0.109	0.220	-0.108	0.316	-0.066	0.089	-0.026	0.451	0.158
Vollrath DA	-0.067	0.082	-0.048	-0.100	-0.050	-0.041	-0.105	-0.111	-0.036	0.032	0.894	0.340	0.070	0.010	-0.093
Wegner DM	-0.071	0.213	-0.059	-0.077	0.235	-0.034	-0.078	-0.108	-0.071	0.076	0.272	0.371	0.213	0.043	-0.065
Woehr DJ	0.084	0.172	0.160	-0.062	-0.120	-0.068	-0.150	-0.055	-0.173	0.092	-0.026	0.036	-0.212	0.635	-0.138
Zaccaro SJ	0.088	0.794	0.237	-0.055	-0.056	0.096	-0.097	-0.036	-0.076	0.700	0.038	0.093	-0.162	0.720	-0.091
Zedeck S	-0.080	0.154	0.005	-0.058	-0.121	-0.029	-0.079	-0.134	-0.138	0.293	-0.077	0.102	-0.251	0.423	-0.128

Appendix F. (Cont.)

Co-citation Correlation Matrix (1990-1995)

	Klein KJ	*Klimoski RJ*	*Kozlowski SWJ*	*Kraiger K*	*Kraut RE*	*Lant TK*	*Levine EL*	*Levine JM*	*Markman AB*	*Mathieu J*	*McNeese M*	*Mohammed S*	*Ocasio W*	*Prince C*	*Rentsch JR*
Klein KJ	1.000														
Klimoski RJ	0.087	1.000													
Kozlowski SWJ	0.866	0.148	1.000												
Kraiger K	0.244	-0.028	0.395	1.000											
Kraut RE	-0.050	-0.081	-0.095	-0.004	1.000										
Lant TK	0.041	-0.071	0.048	-0.025	-0.008	1.000									
Levine EL	0.151	0.085	0.409	0.537	-0.109	-0.099	1.000								
Levine JM	0.338	0.176	0.308	0.310	0.334	-0.040	0.100	1.000							
Markman AB	-0.238	-0.171	-0.233	-0.160	-0.048	-0.041	-0.248	-0.111	1.000						
Mathieu J	0.461	0.060	0.721	0.678	-0.047	0.029	0.629	0.234	-0.163	1.000					
McNeese M	-0.059	-0.152	-0.062	0.164	0.082	-0.098	-0.080	0.103	0.094	0.034	1.000				
Mohammed S	0.331	-0.004	0.276	0.508	0.090	-0.003	0.164	0.727	-0.245	0.299	0.266	1.000			
Ocasio W	-0.056	-0.137	-0.034	-0.073	-0.039	0.879	-0.119	-0.143	-0.084	-0.061	-0.104	-0.093	1.000		
Prince C	0.027	-0.169	0.144	0.549	0.116	-0.104	0.466	0.262	-0.177	0.364	0.109	0.365	-0.107	1.000	
Rentsch JR	0.535	0.077	0.526	0.433	-0.049	-0.026	0.280	0.520	-0.281	0.536	0.196	0.766	-0.138	0.220	1.000

Appendix F. (Cont.)

Co-citation Correlation Matrix (1990-1995)

	Klein KJ	*Klimoski RJ*	*Kozlowski SWJ*	*Kraiger K*	*Kraut RE*	*Lant TK*	*Levine EL*	*Levine JM*	*Markman AB*	*Mathieu J*	*McNeese M*	*Mohammed S*	*Ocasio W*	*Prince C*	*Rentsch JR*
Rouse WB	0.096	-0.136	0.153	0.529	0.054	-0.072	0.233	0.372	-0.133	0.334	0.394	0.627	-0.106	0.503	0.454
Ryan AM	0.305	0.581	0.506	0.347	-0.154	-0.023	0.484	0.127	-0.222	0.562	-0.103	0.159	-0.096	0.131	0.341
Salas E	0.308	-0.048	0.520	0.868	0.031	-0.062	0.614	0.336	-0.212	0.862	0.132	0.482	-0.131	0.674	0.514
Schooler JW	-0.159	-0.147	-0.146	-0.090	-0.060	-0.113	-0.175	0.223	0.579	-0.116	-0.052	0.070	-0.103	-0.116	-0.088
Seifert CM	-0.156	-0.132	-0.146	-0.077	0.163	-0.066	-0.177	0.141	0.550	-0.126	0.076	0.052	-0.072	-0.073	-0.104
Shapira Z	-0.086	-0.144	-0.081	-0.056	-0.034	0.916	-0.131	-0.143	0.020	-0.047	-0.016	-0.091	0.853	-0.056	-0.132
Spector PE	0.335	0.328	0.600	0.169	-0.155	0.057	0.501	0.013	-0.153	0.615	-0.151	-0.037	-0.017	-0.038	0.344
Stout RJ	-0.024	-0.163	0.075	0.516	0.053	-0.147	0.454	0.256	-0.202	0.268	0.147	0.424	-0.143	0.804	0.207
Tannenbaum SI	0.368	-0.017	0.605	0.753	-0.014	-0.004	0.608	0.254	-0.132	0.967	0.097	0.352	-0.083	0.468	0.488
Vollrath DA	-0.072	-0.005	-0.071	-0.028	0.001	-0.057	-0.126	0.295	-0.133	-0.047	-0.098	0.066	-0.058	-0.068	0.028
Wegner DM	-0.030	-0.059	-0.056	-0.009	0.075	-0.057	-0.160	0.543	0.370	-0.059	-0.022	0.410	-0.078	-0.072	0.184
Woehr DJ	0.116	0.596	0.227	0.230	-0.151	-0.078	0.299	0.116	-0.058	0.147	-0.150	-0.005	-0.123	0.122	-0.017
Zaccaro SJ	0.272	0.279	0.380	0.289	-0.132	-0.010	0.325	0.339	-0.249	0.451	-0.090	0.296	-0.068	0.153	0.400
Zedeck S	0.727	0.209	0.579	0.092	-0.019	-0.066	0.123	0.076	-0.136	0.300	-0.075	-0.005	-0.137	-0.045	0.165

Appendix F. (Cont.)

Co-citation Correlation Matrix (1990-1995)

	Rouse WB	*Ryan AM*	*Salas E*	*Schooler JW*	*Seifert CM*	*Shapira Z*	*Spector PE*	*Stout RJ*	*Tannenbaum SI*	*Vollrath DA*	*Wegner DM*	*Woehr DJ*	*Zaccaro SJ*	*Zedeck S*
Rouse WB	1.000													
Ryan AM	0.107	1.000												
Salas E	0.534	0.382	1.000											
Schooler JW	-0.073	-0.131	-0.131	1.000										
Seifert CM	0.033	-0.172	-0.115	0.698	1.000									
Shapira Z	-0.063	-0.116	-0.090	-0.090	-0.074	1.000								
Spector PE	-0.040	0.730	0.290	-0.082	-0.142	-0.052	1.000							
Stout RJ	0.554	0.042	0.574	-0.130	-0.012	-0.097	-0.103	1.000						
Tannenbaum SI	0.416	0.451	0.926	-0.100	-0.099	-0.051	0.413	0.379	1.000					
Vollrath DA	-0.032	-0.070	-0.055	-0.006	-0.074	-0.034	-0.098	-0.074	-0.041	1.000				
Wegner DM	0.042	-0.072	-0.033	0.845	0.568	-0.098	-0.080	-0.071	-0.049	0.119	1.000			
Woehr DJ	-0.007	0.594	0.134	-0.039	-0.103	-0.121	0.332	0.052	0.095	-0.041	-0.051	1.000		
Zaccaro SJ	0.164	0.407	0.334	-0.084	-0.149	-0.094	0.498	0.113	0.356	-0.002	0.103	0.214	1.000	
Zedeck S	-0.031	0.438	0.129	-0.145	-0.181	-0.145	0.358	-0.098	0.209	-0.104	-0.134	0.348	0.103	1.000

Appendix G. *Co-citation Counts (1996-2001)*

	Baker DP	Bandura A	Blickensderfer E	Bowers CA	Cannon-Bowers JA	Clark A	Cooke NJ	Dumville BC	Edmondson AC	Endsley MR	Goodwin GF	Greenberg S	Gully SM	Gutwin C	Heffner TS	Hinsz VB	Hollingshead AB	Hutchins E
Baker DP	35.5	3	9	14	15	0	1	0	1	5	6	0	5	0	5	6	1	0
Bandura A	3	106.5	1	10	24	10	2	7	6	3	11	0	88	1	11	19	2	0
Blickensderfer E	9	1	47.5	27	23	0	5	4	5	4	15	0	4	0	16	10	4	1
Bowers CA	14	10	27	96	32	1	9	4	6	11	16	0	9	1	16	13	3	0
Cannon-Bowers JA	15	24	23	32	209.5	0	30	22	12	9	93	0	16	2	95	19	15	1
Clark A	0	10	0	1	0	16	0	0	1	0	0	3	0	0	0	2	0	9
Cooke NJ	1	2	5	9	30	0	48	10	2	4	12	0	3	0	15	8	3	1
Dumville BC	0	7	4	4	22	0	10	51	6	1	19	0	2	1	20	7	17	1
Edmondson AC	1	6	5	6	12	1	2	6	32.5	3	10	0	4	0	11	12	6	1
Endsley MR	5	3	4	11	9	0	4	1	3	31.5	3	2	1	4	3	2	0	0
Goodwin GF	6	11	15	16	93	0	12	19	10	3	140.5	0	9	1	93	14	15	0
Greenberg S	0	0	0	0	0	3	0	0	0	2	0	8.5	0	12	0	0	1	0
Gully SM	5	88	4	9	16	0	3	2	4	1	9	0	139.5	0	8	13	1	0
Gutwin C	0	1	0	1	2	0	0	1	0	4	1	12	0	10	1	0	2	0
Heffner TS	5	11	16	16	95	0	15	20	11	3	93	0	8	1	143	15	15	0
Hinsz VB	6	19	10	13	19	2	8	7	12	2	14	0	13	0	15	102.5	31	0
Hollingshead AB	1	2	4	3	15	0	3	17	6	0	15	1	1	2	15	31	40	0
Hutchins E	0	0	1	0	1	9	1	1	1	0	0	0	0	0	0	0	0	6.5

Appendix G. (Cont.)

Co-citation Counts (1996-2001)

	Baker DP	Bandura A	Blickensderfer E	Bowers CA	Cannon-Bowers JA	Clark A	Cooke NJ	Dumville BC	Edmondson AC	Endsley MR	Goodwin GF	Greenberg S	Gully SM	Gutwin C	Heffner TS	Hinsz VB	Hollingshead AB	Hutchins E
Ilgen DR	7	30	7	15	22	0	2	6	8	2	19	1	24	0	18	21	15	2
Jentsch F	12	4	10	38	16	0	7	3	1	7	6	0	2	1	6	3	3	0
Klein G	4	6	4	11	15	2	7	4	3	27	4	0	1	2	5	4	1	1
Klein KJ	2	20	0	3	15	0	0	5	23	1	11	0	6	0	11	11	9	1
Klimoski RJ	3	4	1	4	14	0	5	6	4	1	11	0	2	0	11	8	3	0
Kozlowski SWJ	13	38	17	23	43	0	4	10	12	2	28	0	68	0	27	15	4	1
Kraiger K	6	1	10	10	18	0	9	5	1	1	12	0	3	1	15	4	3	0
Kraut RE	0	3	0	1	1	1	0	0	1	0	0	1	0	0	0	1	7	1
Langfield-Smith K	1	2	2	3	6	0	4	2	2	1	3	0	0	0	4	1	0	0
Lant TK	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	1
Levine EL	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Levine JM	2	2	2	0	2	0	0	3	9	0	2	2	1	2	2	20	15	0
Markman AB	0	5	0	0	2	10	3	0	1	0	2	0	1	0	2	0	0	0
Marks MA	6	28	14	17	49	0	10	16	13	1	40	0	16	0	41	14	8	2
Mathieu J	9	58	22	31	109	1	15	22	19	5	94	1	95	1	95	26	18	2
Menon S	0	5	0	0	2	2	0	0	0	0	1	0	1	0	1	0	1	0
Milanovich DM	9	3	17	24	52	0	12	15	6	6	24	0	4	0	26	10	7	0
Millward LJ	0	2	3	1	9	0	2	3	2	1	5	0	1	0	6	2	2	0

Appendix G. (Cont.)

Co-citation Counts (1996-2001)

	Baker DP	Bandura A	Blickensderfer E	Bowers CA	Cannon-Bowers JA	Clark A	Cooke NJ	Dumville BC	Edmondson AC	Endsley MR	Goodwin GF	Greenberg S	Gully SM	Gutwin C	Heffner TS	Hinsz VB	Hollingshead AB	Hutchins E
Mohammed S	2	8	9	10	35	2	13	49	7	1	29	0	2	1	30	12	19	1
Ocasio W	0	1	0	0	0	1	0	0	6	0	0	0	0	0	0	0	0	0
Oser RL	9	1	9	22	17	0	1	1	1	3	4	0	4	0	4	2	1	0
Prince C	6	1	9	21	11	0	2	1	2	8	5	0	3	0	5	3	0	0
Rentsch JR	1	2	1	4	12	0	5	6	3	1	9	0	0	0	13	5	2	0
Ryan AM	0	48	0	0	2	4	0	0	0	0	2	0	16	0	2	2	0	0
Salas E	38	67	42	112	215	1	35	31	23	25	94	0	96	4	96	31	18	2
Schooler JW	0	1	0	0	0	3	0	1	0	0	0	0	0	0	0	0	1	1
Seifert CM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Shapira Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Spector PE	8	25	17	19	11	12	4	2	1	4	7	0	9	0	9	7	2	0
Stout RJ	18	4	26	42	77	0	31	17	7	10	31	0	6	0	34	15	6	1
Tannenbaum SI	7	5	9	12	16	1	1	0	0	2	1	0	11	0	1	2	0	0
Vollrath DA	5	12	10	13	17	0	7	7	12	1	13	0	7	0	14	143	30	0
Volpe CE	8	0	17	17	11	0	4	2	1	4	7	0	3	0	8	6	2	0
Wegner DM	0	19	0	0	0	8	0	0	0	0	0	1	0	0	0	0	1	0
Woehr DJ	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zaccaro SJ	6	26	14	15	48	0	9	14	12	1	40	0	17	0	40	14	7	2

Appendix G. (Cont.)

Co-citation Counts (1996-2001)

	Ilgen DR	Jentsch F	Klein G	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K	Kraut RE	Langfield-Smith K	Lant TK	Levine EL	Levine JM	Markman AB	Marks MA	Mathieu J	Menon S	Milanovich DM	Millward LJ
Baker DP	7	12	4	2	3	13	6	0	1	0	1	2	0	6	9	0	9	0
Bandura A	30	4	6	20	4	38	1	3	2	1	0	2	5	28	58	5	3	2
Blickensderfer E	7	10	4	0	1	17	10	0	2	0	0	2	0	14	22	0	17	3
Bowers CA	15	38	11	3	4	23	10	1	3	0	0	0	0	17	31	0	24	1
Cannon-Bowers JA	22	16	15	15	14	43	18	1	6	0	1	2	2	49	109	2	52	9
Clark A	0	0	2	0	0	0	0	1	0	0	0	0	10	0	1	2	0	0
Cooke NJ	2	7	7	0	5	4	9	0	4	0	0	0	3	10	15	0	12	2
Dumville BC	6	3	4	5	6	10	5	0	2	0	0	3	0	16	22	0	15	3
Edmondson AC	8	1	3	23	4	12	1	1	2	2	0	9	1	13	19	0	6	2
Endsley MR	2	7	27	1	1	2	1	0	1	0	0	0	0	1	5	0	6	1
Goodwin GF	19	6	4	11	11	28	12	0	3	0	0	2	2	40	94	1	24	5
Greenberg S	1	0	0	0	0	0	0	1	0	0	0	2	0	0	1	0	0	0
Gully SM	24	2	1	6	2	68	3	0	0	0	0	1	1	16	95	1	4	1
Gutwin C	0	1	2	0	0	0	1	0	0	0	0	2	0	0	1	0	0	0
Heffner TS	18	6	5	11	11	27	15	0	4	0	0	2	2	41	95	1	26	6
Hinsz VB	21	3	4	11	8	15	4	1	1	0	0	20	0	14	26	0	10	2
Hollingshead AB	15	3	1	9	3	4	3	7	0	1	0	15	0	8	18	1	7	2
Hutchins E	2	0	1	1	0	1	0	1	0	1	0	0	0	2	2	0	0	0

Appendix G. (Cont.)

Co-citation Counts (1996-2001)

	Ilgen DR	Jentsch F	Klein G	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K	Kraut RE	Langfield-Smith K	Lant TK	Levine EL	Levine JM	Markman AB	Marks MA	Mathieu J	Menon S	Milanovich DM	Millward LJ
Ilgen DR	65.5	6	3	20	6	45	4	3	1	1	2	11	0	32	45	4	12	1
Jentsch F	6	52	4	1	2	6	8	0	0	0	0	0	1	4	12	0	15	0
Klein G	3	4	53.5	3	1	7	4	0	3	0	1	1	2	3	6	0	7	1
Klein KJ	20	1	3	53.5	5	51	1	4	2	2	0	4	0	16	30	3	5	0
Klimoski RJ	6	2	1	5	29	6	4	1	0	0	1	3	0	9	14	1	8	0
Kozlowski SWJ	45	6	7	51	6	129	7	0	4	0	1	7	1	47	87	2	15	2
Kraiger K	4	8	4	1	4	7	36.5	0	1	0	0	1	0	9	16	0	14	2
Kraut RE	3	0	0	4	1	0	0	9.5	0	0	0	0	0	0	0	0	1	0
Langfield-Smith K	1	0	3	2	0	4	1	0	10	1	0	0	0	3	3	0	2	1
Lant TK	1	0	0	2	0	0	0	0	1	3.5	0	1	0	0	0	0	0	0
Levine EL	2	0	1	0	1	1	0	0	0	0	18.5	0	0	0	0	14	0	0
Levine JM	11	0	1	4	3	7	1	0	0	1	0	26	2	3	4	0	2	1
Markman AB	0	1	2	0	0	1	0	0	0	0	0	2	11	1	2	0	0	1
Marks MA	32	4	3	16	9	47	9	0	3	0	0	3	1	177	114	1	24	3
Mathieu J	45	12	6	30	14	87	16	0	3	0	0	4	2	114	200.5	3	32	5
Menon S	4	0	0	3	1	2	0	0	0	0	14	0	0	1	3	32.5	0	0
Milanovich DM	12	15	7	5	8	15	14	1	2	0	0	2	0	24	32	0	92	5
Millward LJ	1	0	1	0	0	2	2	0	1	0	0	1	1	3	5	0	5	12

Appendix G. (Cont.)

Co-citation Counts (1996-2001)

	Ilgen DR	Jentsch F	Klein G	Klein KJ	Klimoski RJ	Kozlowski SWJ	Kraiger K	Kraut RE	Langfield-Smith K	Lant TK	Levine EL	Levine JM	Markman AB	Marks MA	Mathieu J	Menon S	Milanovich DM	Millward LJ
Mohammed S	9	4	5	7	9	12	8	0	3	0	0	4	0	21	33	0	20	5
Ocasio W	1	0	3	1	0	0	0	1	0	3	0	0	0	0	0	0	0	0
Oser RL	3	11	5	0	0	8	5	0	1	0	0	0	0	2	6	0	9	1
Prince C	4	8	1	0	1	7	3	0	2	0	0	0	0	4	8	0	21	1
Rentsch JR	3	2	1	5	27	5	4	1	0	0	1	1	0	7	13	0	8	0
Ryan AM	14	0	2	13	5	13	0	0	0	0	7	0	1	3	9	9	0	0
Salas E	41	46	65	26	17	103	32	8	8	1	1	5	3	63	172	2	68	9
Schooler JW	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Seifert CM	0	0	0	0	0	0	0	0	0	0	0	0	3	2	2	0	0	0
Shapira Z	0	0	2	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Spector PE	16	6	7	11	2	22	4	0	1	0	16	2	0	11	17	42	10	3
Stout RJ	16	20	12	3	8	23	23	1	6	0	1	2	0	27	42	0	64	6
Tannenbaum SI	4	7	4	2	0	15	6	0	0	0	0	0	0	5	20	0	4	0
Vollrath DA	15	3	3	11	7	14	4	1	1	0	0	17	0	13	21	0	9	2
Volpe CE	6	6	5	2	0	9	4	0	1	0	0	0	0	9	10	0	10	1
Wegner DM	0	0	1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0
Woehr DJ	1	0	0	0	1	1	0	0	0	0	2	1	0	0	0	1	0	2
Zaccaro SJ	31	4	2	21	9	57	8	0	2	0	0	5	1	177	115	3	23	2

Appendix G. (Cont.)

Co-citation Counts (1996-2001)

	Mohammed S	Ocasio W	Oser RL	Prince C	Rentsch JR	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Volpe CE	Wegner DM	Woehr DJ	Zaccaro SJ
Baker DP	2	0	9	6	1	0	38	0	0	0	8	18	7	5	8	0	0	6
Bandura A	8	1	1	1	2	48	67	1	0	0	25	4	5	12	0	19	2	26
Blickensderfer E	9	0	9	9	1	0	42	0	0	0	17	26	9	10	17	0	0	14
Bowers CA	10	0	22	21	4	0	112	0	0	0	19	42	12	13	17	0	0	15
Cannon-Bowers JA	35	0	17	11	12	2	215	0	0	0	11	77	16	17	11	0	0	48
Clark A	2	1	0	0	0	4	1	3	0	0	12	0	1	0	0	8	0	0
Cooke NJ	13	0	1	2	5	0	35	0	0	0	4	31	1	7	4	0	0	9
Dumville BC	49	0	1	1	6	0	31	1	0	0	2	17	0	7	2	0	0	14
Edmondson AC	7	6	1	2	3	0	23	0	0	0	1	7	0	12	1	0	0	12
Endsley MR	1	0	3	8	1	0	25	0	0	1	4	10	2	1	4	0	0	1
Goodwin GF	29	0	4	5	9	2	94	0	0	0	7	31	1	13	7	0	0	40
Greenberg S	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Gully SM	2	0	4	3	0	16	96	0	0	0	9	6	11	7	3	0	0	17
Gutwin C	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Heffner TS	30	0	4	5	13	2	96	0	0	0	9	34	1	14	8	0	0	40
Hinsz VB	12	0	2	3	5	2	31	0	0	0	7	15	2	143	6	0	0	14
Hollingshead AB	19	0	1	0	2	0	18	1	0	0	2	6	0	30	2	1	0	7
Hutchins E	1	0	0	0	0	0	2	1	0	0	0	1	0	0	0	0	0	2

Appendix G. (Cont.)

Co-citation Counts (1996-2001)

	Mohammed S	Ocasio W	Oser RL	Prince C	Rentsch JR	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Volpe CE	Wegner DM	Woehr DJ	Zaccaro SJ
Ilgen DR	9	1	3	4	3	14	41	0	0	0	16	16	4	15	6	0	1	31
Jentsch F	4	0	11	8	2	0	46	0	0	0	6	20	7	3	6	0	0	4
Klein G	5	3	5	1	1	2	65	0	0	2	7	12	4	3	5	1	0	2
Klein KJ	7	1	0	0	5	13	26	0	0	0	11	3	2	11	2	0	0	21
Klimoski RJ	9	0	0	1	27	5	17	0	0	0	2	8	0	7	0	0	1	9
Kozlowski SWJ	12	0	8	7	5	13	103	0	0	0	22	23	15	14	9	0	1	57
Kraiger K	8	0	5	3	4	0	32	0	0	0	4	23	6	4	4	0	0	8
Kraut RE	0	1	0	0	1	0	8	0	0	1	0	1	0	1	0	0	0	0
Langfield-Smith K	3	0	1	2	0	0	8	0	0	0	1	6	0	1	1	0	0	2
Lant TK	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Levine EL	0	0	0	0	1	7	1	0	0	0	16	1	0	0	0	0	2	0
Levine JM	4	0	0	0	1	0	5	0	0	0	2	2	0	17	0	0	1	5
Markman AB	0	0	0	0	0	1	3	5	3	1	0	0	0	0	0	7	0	1
Marks MA	21	0	2	4	7	3	63	0	2	0	11	27	5	13	9	0	0	177
Mathieu J	33	0	6	8	13	9	172	0	2	0	17	42	20	21	10	0	0	115
Menon S	0	0	0	0	0	9	2	0	0	0	42	0	0	0	0	0	1	3
Milanovich DM	20	0	9	21	8	0	68	0	0	0	10	64	4	9	10	0	0	23
Millward LJ	5	0	1	1	0	0	9	0	0	0	3	6	0	2	1	0	2	2

Appendix G. (Cont.)

Co-citation Counts (1996-2001)

	Mohammed S	Ocasio W	Oser RL	Prince C	Rentsch JR	Ryan AM	Salas E	Schooler JW	Seifert CM	Shapira Z	Spector PE	Stout RJ	Tannenbaum SI	Vollrath DA	Volpe CE	Wegner DM	Woehr DJ	Zaccaro SJ
Mohammed S	64.5	0	1	2	7	0	45	1	0	1	5	24	0	12	4	0	0	19
Ocasio W	0	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Oser RL	1	0	40	16	0	0	38	0	0	0	8	20	9	2	8	0	0	2
Prince C	2	0	16	40.5	1	0	30	0	0	0	7	30	5	2	7	0	0	4
Rentsch JR	7	0	0	1	27.5	1	15	0	0	0	11	8	0	4	0	0	0	7
Ryan AM	0	1	0	0	1	50.5	8	0	0	0	37	0	3	0	0	1	7	4
Salas E	45	0	38	30	15	8	249.5	0	0	2	40	109	36	27	32	0	2	59
Schooler JW	1	0	0	0	0	0	0	7	0	0	0	0	0	0	0	6	0	0
Seifert CM	0	0	0	0	0	0	0	0	3.5	0	0	0	0	0	0	0	0	2
Shapira Z	1	0	0	0	0	0	2	0	0	2.5	0	0	0	0	0	0	0	0
Spector PE	5	0	8	7	11	37	40	0	0	0	59.5	17	10	6	32	0	4	11
Stout RJ	24	0	20	30	8	0	109	0	0	0	17	125	8	14	16	0	0	26
Tannenbaum SI	0	0	9	5	0	3	36	0	0	0	10	8	26	2	8	0	1	4
Vollrath DA	12	0	2	2	4	0	27	0	0	0	6	14	2	100	6	0	0	14
Volpe CE	4	0	8	7	0	0	32	0	0	0	32	16	8	6	40.5	0	0	9
Wegner DM	0	0	0	0	0	1	0	6	0	0	0	0	0	0	0	17	0	0
Woehr DJ	0	0	0	0	0	7	2	0	0	0	4	0	1	0	0	0	6.5	0
Zaccaro SJ	19	0	2	4	7	4	59	0	2	0	11	26	4	14	9	0	0	175.5

Appendix H. *Co-citation Correlation Matrix (1996-2001)*

	Baker DP	*Bandura A*	*Blickensderfer E*	*Bowers CA*	*Cannon-Bowers JA*	*Clark A*	*Cooke NJ*	*Dumville BC*	*Edmondson AC*	*Endsley MR*	*Goodwin GF*	*Greenberg S*	*Gully SM*
Baker DP	1.000												
Bandura A	0.258	1.000											
Blickensderfer E	0.696	0.202	1.000										
Bowers CA	0.764	0.292	0.794	1.000									
Cannon-Bowers JA	0.625	0.378	0.678	0.664	1.000								
Clark A	-0.185	0.222	-0.192	-0.144	-0.183	1.000							
Cooke NJ	0.445	0.154	0.539	0.535	0.725	-0.195	1.000						
Dumville BC	0.234	0.195	0.382	0.317	0.580	-0.185	0.549	1.000					
Edmondson AC	0.295	0.347	0.392	0.370	0.537	-0.206	0.323	0.437	1.000				
Endsley MR	0.485	0.103	0.392	0.552	0.405	-0.122	0.372	0.128	0.168	1.000			
Goodwin GF	0.416	0.317	0.567	0.465	0.858	-0.193	0.568	0.594	0.535	0.221	1.000		
Greenberg S	-0.180	-0.123	-0.207	-0.165	-0.150	0.073	-0.179	-0.154	-0.170	0.013	-0.139	1.000	
Gully SM	0.360	0.904	0.301	0.376	0.427	0.027	0.209	0.204	0.359	0.155	0.358	-0.101	1.000
Gutwin C	0.023	-0.026	-0.021	0.075	0.109	-0.049	0.024	0.045	-0.038	0.289	0.060	0.872	0.010
Heffner TS	0.411	0.308	0.575	0.467	0.862	-0.194	0.593	0.601	0.538	0.224	0.950	-0.144	0.348
Hinsz VB	0.161	0.193	0.220	0.174	0.190	-0.104	0.184	0.186	0.402	0.005	0.191	-0.109	0.167
Hollingshead AB	0.145	0.128	0.266	0.186	0.391	-0.215	0.293	0.583	0.507	-0.015	0.454	-0.072	0.124
Hutchins E	-0.015	0.056	0.030	0.019	0.090	0.522	0.066	0.083	0.113	-0.027	0.057	0.048	0.046

Appendix H. (Cont.)

Co-citation Correlation Matrix (1996-2001)

	Baker DP	*Bandura A*	*Blickensderfer E*	*Bowers CA*	*Cannon-Bowers JA*	*Clark A*	*Cooke NJ*	*Dumville BC*	*Edmondson AC*	*Endsley MR*	*Goodwin GF*	*Greenberg S*	*Gully SM*
Ilgen DR	0.420	0.673	0.448	0.433	0.534	-0.108	0.279	0.364	0.583	0.111	0.540	-0.149	0.651
Jentsch F	0.715	0.159	0.639	0.873	0.533	-0.166	0.478	0.238	0.206	0.504	0.339	-0.146	0.235
Klein G	0.542	0.242	0.436	0.608	0.546	-0.043	0.461	0.265	0.283	0.873	0.317	-0.081	0.283
Klein KJ	0.240	0.529	0.239	0.228	0.392	-0.079	0.132	0.290	0.754	0.032	0.404	-0.150	0.486
Klimoski RJ	0.277	0.224	0.291	0.298	0.534	-0.223	0.440	0.470	0.419	0.096	0.538	-0.185	0.224
Kozlowski SWJ	0.518	0.698	0.525	0.515	0.616	-0.130	0.333	0.365	0.604	0.195	0.560	-0.161	0.787
Kraiger K	0.619	0.177	0.700	0.643	0.725	-0.249	0.684	0.477	0.332	0.339	0.613	-0.182	0.277
Kraut RE	0.200	0.214	0.098	0.268	0.250	-0.001	0.112	0.133	0.281	0.123	0.112	0.004	0.188
Langfield-Smith K	0.468	0.215	0.547	0.540	0.673	-0.209	0.661	0.473	0.435	0.389	0.547	-0.209	0.250
Lant TK	-0.116	0.032	-0.181	-0.092	-0.076	-0.030	-0.156	-0.093	0.340	-0.102	-0.105	-0.084	0.002
Levine EL	-0.047	0.021	-0.071	-0.081	-0.106	0.195	-0.125	-0.161	-0.201	-0.080	-0.124	-0.097	-0.063
Levine JM	0.040	0.071	0.056	-0.008	0.044	-0.142	-0.004	0.165	0.454	-0.110	0.072	0.034	0.063
Markman AB	-0.112	0.204	-0.143	-0.070	0.049	0.666	0.044	-0.079	-0.056	-0.052	0.048	0.015	0.109
Marks MA	0.262	0.392	0.409	0.297	0.499	-0.150	0.329	0.411	0.498	0.048	0.556	-0.125	0.363
Mathieu J	0.481	0.646	0.586	0.535	0.807	-0.158	0.510	0.534	0.626	0.221	0.823	-0.150	0.716
Menon S	-0.033	0.144	-0.002	-0.040	-0.060	0.347	-0.103	-0.115	-0.118	-0.077	-0.058	-0.085	0.025
Milanovich DM	0.599	0.167	0.697	0.655	0.753	-0.232	0.665	0.536	0.395	0.391	0.597	-0.182	0.232
Millward LJ	0.373	0.214	0.556	0.430	0.728	-0.157	0.587	0.576	0.400	0.255	0.652	-0.189	0.247

Appendix H. (Cont.)

Co-citation Correlation Matrix (1996-2001)

	Baker DP	*Bandura A*	*Blickensderfer E*	*Bowers CA*	*Cannon-Bowers JA*	*Clark A*	*Cooke NJ*	*Dumville BC*	*Edmondson AC*	*Endsley MR*	*Goodwin GF*	*Greenberg S*	*Gully SM*
Mohammed S	0.323	0.223	0.492	0.414	0.689	-0.185	0.618	0.978	0.490	0.173	0.698	-0.169	0.238
Ocasio W	-0.191	-0.032	-0.212	-0.163	-0.158	0.038	-0.179	-0.151	0.329	0.034	-0.156	-0.072	-0.078
Oser RL	0.722	0.143	0.654	0.792	0.555	-0.162	0.406	0.178	0.179	0.473	0.318	-0.167	0.251
Prince C	0.621	0.084	0.637	0.726	0.482	-0.187	0.424	0.195	0.184	0.485	0.299	-0.160	0.186
Rentsch JR	0.253	0.152	0.309	0.299	0.501	-0.136	0.434	0.436	0.354	0.113	0.505	-0.176	0.158
Ryan AM	-0.014	0.707	-0.056	-0.017	-0.006	0.407	-0.119	-0.082	0.014	-0.071	-0.015	-0.111	0.450
Salas E	0.700	0.536	0.741	0.779	0.931	-0.172	0.672	0.523	0.536	0.489	0.781	-0.189	0.623
Schooler JW	-0.226	-0.033	-0.245	-0.202	-0.176	0.537	-0.164	-0.072	-0.210	-0.185	-0.166	-0.001	-0.109
Seifert CM	-0.098	0.060	-0.028	-0.069	0.029	0.088	-0.024	0.007	0.057	-0.131	0.094	0.068	0.072
Shapira Z	0.154	0.033	0.059	0.204	0.171	0.015	0.130	0.128	0.028	0.522	0.049	-0.059	0.073
Spector PE	0.380	0.447	0.438	0.419	0.280	0.257	0.155	0.053	0.098	0.184	0.181	-0.196	0.341
Stout RJ	0.705	0.187	0.765	0.756	0.808	-0.224	0.785	0.512	0.388	0.468	0.606	-0.188	0.266
Tannenbaum SI	0.728	0.471	0.691	0.744	0.658	-0.081	0.405	0.219	0.315	0.421	0.424	-0.160	0.602
Vollrath DA	0.150	0.147	0.213	0.160	0.170	-0.096	0.177	0.178	0.387	-0.001	0.174	-0.107	0.121
Volpe CE	0.625	0.163	0.763	0.663	0.469	-0.028	0.388	0.209	0.206	0.380	0.345	-0.185	0.220
Wegner DM	-0.175	0.385	-0.233	-0.150	-0.132	0.649	-0.168	-0.134	-0.149	-0.111	-0.143	0.032	0.160
Woehr DJ	-0.035	0.266	-0.081	-0.033	-0.059	0.180	-0.129	-0.141	-0.145	-0.074	-0.104	-0.106	0.098
Zaccaro SJ	0.256	0.394	0.401	0.284	0.488	-0.153	0.314	0.397	0.503	0.035	0.550	-0.124	0.369

Appendix H. (Cont.)

Co-citation Correlation Matrix (1996-2001)

	Gutwin C	*Heffner TS*	*Hinsz VB*	*Hollingshead AB*	*Hutchins E*	*Ilgen DR*	*Jentsch F*	*Klein G*	*Klein KJ*	*Klimoski RJ*	*Kozlowski SWJ*	*Kraiger K*	*Kraut RE*
Gutwin C	1.000												
Heffner TS	0.058	1.000											
Hinsz VB	-0.064	0.195	1.000										
Hollingshead AB	0.041	0.453	0.727	1.000									
Hutchins E	-0.096	0.055	-0.063	-0.026	1.000								
Ilgen DR	-0.064	0.529	0.345	0.448	0.120	1.000							
Jentsch F	0.079	0.341	0.068	0.107	-0.036	0.272	1.000						
Klein G	0.223	0.324	0.074	0.099	0.072	0.224	0.490	1.000					
Klein KJ	-0.078	0.396	0.250	0.331	0.103	0.737	0.086	0.165	1.000				
Klimoski RJ	-0.056	0.547	0.247	0.348	-0.020	0.395	0.212	0.190	0.341	1.000			
Kozlowski SWJ	-0.031	0.551	0.204	0.252	0.121	0.845	0.329	0.347	0.810	0.373	1.000		
Kraiger K	0.042	0.638	0.133	0.265	0.007	0.368	0.586	0.448	0.187	0.428	0.439	1.000	
Kraut RE	0.094	0.110	0.153	0.401	0.119	0.264	0.189	0.286	0.286	0.149	0.194	0.125	1.000
Langfield-Smith K	-0.003	0.569	0.102	0.190	0.040	0.357	0.380	0.496	0.330	0.281	0.466	0.543	0.107
Lant TK	-0.070	-0.109	-0.046	0.035	0.088	0.045	-0.115	-0.005	0.233	-0.123	0.000	-0.172	0.242
Levine EL	-0.113	-0.122	-0.114	-0.167	-0.121	-0.020	-0.101	-0.038	-0.028	-0.077	-0.064	-0.137	-0.106
Levine JM	0.039	0.069	0.695	0.738	-0.064	0.374	-0.081	-0.028	0.298	0.167	0.168	-0.008	0.193
Markman AB	-0.084	0.044	-0.109	-0.141	0.357	-0.063	-0.067	0.061	-0.050	-0.112	-0.006	-0.092	-0.033
Marks MA	-0.059	0.554	0.149	0.256	0.195	0.637	0.160	0.120	0.481	0.391	0.620	0.374	0.006
Mathieu J	0.022	0.819	0.225	0.384	0.138	0.773	0.366	0.351	0.599	0.513	0.847	0.583	0.158
Menon S	-0.104	-0.056	-0.077	-0.110	-0.069	0.087	-0.080	-0.039	0.087	-0.069	0.034	-0.106	-0.065

Appendix H. (Cont.)

Co-citation Correlation Matrix (1996-2001)

	Gutwin C	*Heffner TS*	*Hinsz VB*	*Hollingshead AB*	*Hutchins E*	*Ilgen DR*	*Jentsch F*	*Klein G*	*Klein KJ*	*Klimoski RJ*	*Kozlowski SWJ*	*Kraiger K*	*Kraut RE*
Milanovich DM	0.000	0.609	0.150	0.293	0.024	0.406	0.583	0.427	0.222	0.448	0.431	0.731	0.163
Millward LJ	0.012	0.671	0.179	0.374	-0.009	0.338	0.308	0.355	0.206	0.329	0.375	0.581	0.101
Mohammed S	0.044	0.705	0.237	0.607	0.094	0.424	0.309	0.313	0.321	0.525	0.423	0.567	0.145
Ocasio W	-0.093	-0.157	-0.095	-0.129	0.075	-0.084	-0.174	0.092	0.106	-0.153	-0.114	-0.217	0.082
Oser RL	0.026	0.320	0.044	0.043	-0.043	0.234	0.711	0.513	0.075	0.134	0.354	0.551	0.167
Prince C	-0.015	0.303	0.045	0.028	-0.051	0.229	0.631	0.391	0.048	0.163	0.298	0.522	0.105
Rentsch JR	-0.054	0.538	0.152	0.265	-0.030	0.314	0.218	0.189	0.296	0.960	0.322	0.428	0.119
Ryan AM	-0.102	-0.020	-0.011	-0.113	-0.052	0.381	-0.077	0.010	0.373	0.041	0.304	-0.112	0.070
Salas E	0.072	0.782	0.198	0.325	0.060	0.636	0.631	0.596	0.457	0.475	0.752	0.721	0.215
Schooler JW	-0.104	-0.169	-0.132	-0.108	0.200	-0.221	-0.180	-0.129	-0.180	-0.207	-0.199	-0.220	-0.061
Seifert CM	0.025	0.090	-0.058	-0.051	0.038	0.107	-0.101	-0.111	0.061	0.003	0.120	-0.035	-0.139
Shapira Z	0.121	0.050	-0.061	-0.010	0.011	-0.047	0.142	0.635	-0.035	-0.012	0.048	0.094	0.320
Spector PE	-0.116	0.189	0.039	-0.029	0.000	0.408	0.281	0.283	0.319	0.132	0.409	0.225	0.076
Stout RJ	0.019	0.621	0.165	0.267	0.046	0.410	0.655	0.516	0.203	0.423	0.461	0.798	0.180
Tannenbaum SI	0.035	0.422	0.099	0.092	0.044	0.494	0.624	0.547	0.351	0.221	0.677	0.589	0.196
Vollrath DA	-0.065	0.178	0.938	0.723	-0.073	0.315	0.060	0.062	0.229	0.236	0.170	0.123	0.138
Volpe CE	-0.037	0.355	0.133	0.121	-0.031	0.338	0.518	0.428	0.171	0.136	0.391	0.483	0.089
Wegner DM	-0.041	-0.147	-0.070	-0.162	0.115	-0.037	-0.143	-0.063	-0.031	-0.162	-0.072	-0.211	0.047
Woehr DJ	-0.091	-0.105	-0.094	-0.161	-0.129	0.082	-0.070	0.021	0.075	-0.019	0.042	-0.120	-0.015
Zaccaro SJ	-0.064	0.546	0.151	0.251	0.194	0.645	0.147	0.106	0.507	0.387	0.638	0.361	-0.002

Appendix H. (Cont.)

Co-citation Correlation Matrix (1996-2001)

	Langfield-Smith K	*Lant TK*	*Levine EL*	*Levine JM*	*Markman AB*	*Marks MA*	*Mathieu J*	*Menon S*	*Milanovich DM*	*Millward LJ*
Langfield-Smith K	1.000									
Lant TK	0.050	1.000								
Levine EL	-0.145	-0.123	1.000							
Levine JM	-0.030	0.160	-0.120	1.000						
Markman AB	-0.051	-0.106	-0.147	-0.095	1.000					
Marks MA	0.351	-0.099	-0.113	0.108	-0.005	1.000				
Mathieu J	0.517	-0.077	-0.128	0.112	0.047	0.788	1.000			
Menon S	-0.105	-0.082	0.873	-0.083	-0.091	-0.018	-0.026	1.000		
Milanovich DM	0.576	-0.147	-0.121	0.021	-0.105	0.412	0.567	-0.091	1.000	
Millward LJ	0.556	-0.134	-0.095	0.080	-0.007	0.344	0.557	-0.033	0.650	1.000
Mohammed S	0.541	-0.112	-0.161	0.174	-0.067	0.461	0.621	-0.106	0.614	0.654
Ocasio W	-0.067	0.719	-0.070	0.008	-0.014	-0.123	-0.154	-0.071	-0.186	-0.163
Oser RL	0.439	-0.124	-0.064	-0.102	-0.114	0.119	0.340	-0.043	0.566	0.359
Prince C	0.462	-0.146	-0.084	-0.099	-0.154	0.155	0.311	-0.065	0.711	0.370

Appendix H. (Cont.)

Co-citation Correlation Matrix (1996-2001)

	Langfield-Smith K	*Lant TK*	*Levine EL*	*Levine JM*	*Markman AB*	*Marks MA*	*Mathieu J*	*Menon S*	*Milanovich DM*	*Millward LJ*
Rentsch JR	0.276	-0.136	0.020	0.070	-0.116	0.337	0.459	0.069	0.445	0.332
Ryan AM	-0.049	0.031	0.432	-0.050	0.081	0.064	0.164	0.529	-0.105	-0.038
Salas E	0.659	-0.118	-0.115	0.026	0.007	0.507	0.856	-0.045	0.736	0.650
Schooler JW	-0.213	-0.093	-0.111	-0.113	0.741	-0.152	-0.190	-0.090	-0.204	-0.167
Seifert CM	-0.067	-0.142	-0.109	-0.045	0.362	0.454	0.251	-0.063	-0.021	-0.031
Shapira Z	0.145	-0.063	-0.081	-0.093	0.149	-0.048	0.055	-0.099	0.077	0.086
Spector PE	0.185	-0.140	0.624	-0.073	-0.075	0.175	0.303	0.748	0.246	0.184
Stout RJ	0.683	-0.148	-0.100	0.002	-0.087	0.376	0.579	-0.081	0.910	0.660
Tannenbaum SI	0.418	-0.108	-0.022	-0.047	-0.041	0.324	0.634	0.045	0.499	0.372
Vollrath DA	0.093	-0.050	-0.113	0.703	-0.123	0.135	0.193	-0.081	0.140	0.167
Volpe CE	0.385	-0.161	0.122	-0.022	-0.159	0.266	0.384	0.241	0.506	0.371
Wegner DM	-0.136	0.002	-0.090	-0.113	0.704	-0.089	-0.081	-0.018	-0.196	-0.137
Woehr DJ	-0.121	-0.072	0.490	-0.049	-0.065	-0.096	-0.057	0.430	-0.122	0.069
Zaccaro SJ	0.342	-0.098	-0.107	0.117	-0.008	0.999	0.787	-0.011	0.399	0.330

Appendix H. (Cont.)

Co-citation Correlation Matrix (1996-2001)

	Mohammed S	*Ocasio W*	*Oser RL*	*Prince C*	*Rentsch JR*	*Ryan AM*	*Salas E*	*Schooler JW*	*Seifert CM*	*Shapira Z*
Mohammed S	1.000									
Ocasio W	-0.174	1.000								
Oser RL	0.248	-0.168	1.000							
Prince C	0.263	-0.183	0.790	1.000						
Rentsch JR	0.489	-0.162	0.151	0.185	1.000					
Ryan AM	-0.084	0.033	-0.066	-0.096	0.048	1.000				
Salas E	0.628	-0.150	0.634	0.557	0.446	0.096	1.000			
Schooler JW	-0.105	-0.077	-0.194	-0.200	-0.193	-0.068	-0.228	1.000		
Seifert CM	0.013	-0.117	-0.140	-0.111	-0.008	-0.071	0.011	0.145	1.000	
Shapira Z	0.146	0.063	0.146	0.069	-0.014	-0.096	0.174	0.022	0.017	1.000
Spector PE	0.107	-0.143	0.337	0.286	0.205	0.653	0.371	-0.208	-0.121	-0.013
Stout RJ	0.603	-0.194	0.688	0.767	0.421	-0.100	0.807	-0.213	-0.052	0.117
Tannenbaum SI	0.299	-0.173	0.705	0.541	0.221	0.158	0.780	-0.203	-0.013	0.163
Vollrath DA	0.228	-0.093	0.036	0.041	0.147	-0.043	0.170	-0.127	-0.057	-0.062
Volpe CE	0.292	-0.194	0.597	0.548	0.225	0.086	0.549	-0.220	-0.066	0.083
Wegner DM	-0.155	0.016	-0.168	-0.177	-0.175	0.340	-0.115	0.677	0.045	-0.026
Woehr DJ	-0.143	-0.041	-0.042	-0.084	-0.016	0.682	-0.062	-0.118	-0.135	-0.050
Zaccaro SJ	0.447	-0.125	0.109	0.146	0.332	0.071	0.500	-0.154	0.454	-0.058

Appendix H. (Cont.)

Co-citation Correlation Matrix (1996-2001)

	Spector PE	*Stout RJ*	*Tannenbaum SI*	*Vollrath DA*	*Volpe CE*	*Wegner DM*	*Woehr DJ*	*Zaccaro SJ*
Spector PE	1.000							
Stout RJ	0.303	1.000						
Tannenbaum SI	0.487	0.596	1.000					
Vollrath DA	0.021	0.154	0.075	1.000				
Volpe CE	0.657	0.580	0.634	0.128	1.000			
Wegner DM	-0.004	-0.201	-0.120	-0.091	-0.208	1.000		
Woehr DJ	0.488	-0.105	0.092	-0.106	0.050	0.033	1.000	
Zaccaro SJ	0.179	0.362	0.321	0.136	0.258	-0.094	-0.093	1.000

Appendix I. *Co-citation Counts (2002-2007)*

	Bandura A	Bell BS	Burke CS	Edmondson AC	Gully SM	Hollingshead AB	Ilgen DR	Jundt D	Klein G	Klein KJ	Kozlowski SWJ	Kraut RE	Levine JM	Marks MA	Mathieu J	Mohammed S	Ryan AM	Salas E	Spector PE	Zaccaro SJ
Bandura A	12.5	3	0	1	15	0	2	0	0	0	4	1	1	0	6	1	2	0	2	4
Bell BS	3	47	4	4	0	1	10	4	0	2	72	3	0	4	12	5	8	7	0	8
Burke CS	0	4	45.5	4	6	4	14	4	1	0	13	0	1	27	8	5	0	35	0	29
Edmondson AC	1	4	4	9.5	1	1	6	3	1	1	9	0	1	2	3	0	0	3	1	4
Gully SM	15	0	6	1	20.5	0	10	3	0	2	14	1	0	5	12	7	2	2	0	9
Hollingshead AB	0	1	4	1	0	6	1	1	0	0	3	0	4	3	1	0	0	4	0	3
Ilgen DR	2	10	14	6	10	1	39.5	36	1	2	24	0	0	10	11	8	1	19	3	12
Jundt D	0	4	4	3	3	1	36	28.5	0	2	10	0	0	4	6	3	0	11	1	4
Klein G	0	0	1	1	0	0	1	0	2.5	0	1	0	0	1	0	1	0	3	0	0
Klein KJ	0	2	0	1	2	0	2	2	0	8.5	5	0	0	0	4	2	0	1	8	0
Kozlowski SWJ	4	72	13	9	14	3	24	10	1	5	57.5	3	0	10	19	9	1	18	2	15
Kraut RE	1	3	0	0	1	0	0	0	0	0	3	3.5	0	0	0	0	0	1	0	0
Levine JM	1	0	1	1	0	4	0	0	0	0	0	0	3	1	1	0	0	1	0	1
Marks MA	0	4	27	2	5	3	10	4	1	0	10	0	1	31.5	12	4	0	11	0	25
Mathieu J	6	12	8	3	12	1	11	6	0	4	19	0	1	12	26.5	18	2	7	1	16
Mohammed S	1	5	5	0	7	0	8	3	1	2	9	0	0	4	18	17.5	2	3	1	5
Ryan AM	2	8	0	0	2	0	1	0	0	0	1	0	0	0	2	2	6	0	1	1
Salas E	0	7	35	3	2	4	19	11	3	1	18	1	1	11	7	3	0	36	0	13
Spector PE	2	0	0	1	0	0	3	1	0	8	2	0	0	0	1	1	1	0	6.5	1
Zaccaro SJ	4	8	29	4	9	3	12	4	0	0	15	0	1	25	16	5	1	13	1	35

Appendix J. *Co-citation Correlation Matrix (2002-2007)*

	Bandura A	*Bell BS*	*Burke CS*	*Edmondson AC*	*Gully SM*	*Hollingshead AB*	*Ilgen DR*	*Jundt D*	*Klein G*	*Klein KJ*
Bandura A	1.000									
Bell BS	0.064	1.000								
Burke CS	-0.181	0.054	1.000							
Edmondson AC	-0.067	0.573	0.304	1.000						
Gully SM	0.824	0.213	0.151	0.175	1.000					
Hollingshead AB	-0.325	0.110	0.575	0.220	-0.156	1.000				
Ilgen DR	-0.061	0.322	0.373	0.534	0.309	0.108	1.000			
Jundt D	-0.132	0.141	0.182	0.410	0.172	0.014	0.947	1.000		
Klein G	-0.338	0.028	0.451	0.232	-0.138	0.182	0.213	0.149	1.000	
Klein KJ	0.004	0.231	-0.262	0.086	0.046	-0.328	0.078	0.076	-0.197	1.000
Kozlowski SWJ	0.113	0.902	0.162	0.562	0.210	0.092	0.417	0.249	0.040	0.178
Kraut RE	0.197	0.654	-0.113	0.164	0.109	-0.099	0.008	-0.092	-0.062	0.010
Levine JM	-0.137	-0.245	0.099	-0.082	-0.214	0.780	-0.293	-0.246	-0.114	-0.378
Marks MA	-0.111	0.077	0.876	0.271	0.244	0.487	0.322	0.141	0.208	-0.246
Mathieu J	0.324	0.470	0.319	0.324	0.642	0.018	0.404	0.221	-0.026	0.165
Mohammed S	0.209	0.287	0.152	0.115	0.528	-0.143	0.332	0.217	0.027	0.209
Ryan AM	0.275	0.418	-0.248	-0.079	0.047	-0.329	-0.099	-0.128	-0.308	-0.017
Salas E	-0.251	0.224	0.891	0.427	0.098	0.539	0.596	0.434	0.574	-0.147
Spector PE	-0.052	-0.040	-0.282	-0.026	-0.050	-0.377	-0.017	0.074	-0.241	0.861
Zaccaro SJ	0.048	0.184	0.863	0.364	0.377	0.452	0.354	0.143	0.132	-0.210

Appendix J. (Cont.)

Co-citation Correlation Matrix (2002-2007)

	Kozlowski SWJ	*Kraut RE*	*Levine JM*	*Marks MA*	*Mathieu J*	*Mohammed S*	*Ryan AM*	*Salas E*	*Spector PE*	*Zaccaro SJ*
Kozlowski SWJ	1.000									
Kraut RE	0.621	1.000								
Levine JM	-0.269	-0.284	1.000							
Marks MA	0.166	-0.170	0.092	1.000						
Mathieu J	0.529	0.089	-0.199	0.484	1.000					
Mohammed S	0.336	-0.036	-0.260	0.264	0.896	1.000				
Ryan AM	0.526	0.315	-0.302	-0.196	0.216	0.202	1.000			
Salas E	0.318	0.030	0.007	0.637	0.266	0.158	-0.222	1.000		
Spector PE	-0.112	-0.191	-0.316	-0.274	-0.112	-0.063	-0.104	-0.227	1.000	
Zaccaro SJ	0.279	-0.091	0.055	0.951	0.591	0.332	-0.095	0.644	-0.254	1.000

Bibliography

Artman, H., & Waern, Y. (1999). Distributed cognition in an emergency co-ordination center. *Cognition, Technology, and Work,* (1), 237-246.

Bierhals, R., Schuster, I., Kohler, P., & Badke-Schaub, P. (2007). Shared mental models - linking team cognition and performance. *CoDesign, 3*(1), 75-94.

Borg, I., & Groenen, P.J.F. (2005). *Modern Multidimensional Scaling.* New York: Springer.

Borgman, C.L. (Oct 1989). "Bibliometrics and scholarly communication." *Communication Research,* 16 (5), 583-599.

Clark, A. (1997). *Being there: Putting brain, body, and world together again.* Cambridge, MA: MIT Press.

Cooke, N. J., Salas, E., Kiekel, P. A., & Bell, B. (2004). Advances in measuring team cognition. In E. Salas, & S. M. Fiore (Eds.), *Team cognition: Understanding the factors that drive process and performance*. Washington, DC: American Psychological Association.

Cooke, N. J., Stout, R. J., Rivera, K., & Salas, E. (1998). Exploring measures of team knowledge. *Proceedings of the Human Factors and Ergonomics Society,* (1), 215-219.

Culnan, M.J. (1986). The intellectual development of management information systems, 1972-1982: A co-citation analysis. *Management Science*, 32(2), 156-173.

Espinosa, J. A., Lerch, F. J., & Kraut, R. E. (2004). Explicit vs. implicit coordination mechanisms and task dependencies: One size does not fit all. In E. Salas, & S. M. Fiore (Eds.), *Team cognition: Understanding the factors that drive process and performance*. Washington, DC: American Psychological Association.

Garson, G.D. (2006). *Multidimensional Scaling*. Retrieved December 2008, from NC State University: Quantitative Research in Public Administration: http://www2.chass.ncsu.edu/garson/pa765/index.htm.

Gievre, R. N., & Moffatt, B. (2006). Distributed cognition: Where the cognitive and social emerge. *Social Studies of Science, 33*(2), 301-310.

Gorman, J. C., Cooke, N. J., & Winner, J. L. (2006). Measuring team situation awareness in decentralized command and control environments. *Ergonomics, 49*(12), 1312-1325.

Gutwin, C., & Greenberg, S. (2004). The importance of awareness for team cognition in distributed collaboration. In E. Salas, & S. M. Fiore (Eds.). Washington, D.C.: American Psychological Association.

Hutchins, E. (1995). *Cognition in the wild*. Cambridge, MA: MIT Press.

Hutchins, E. (2000). *Distributed cognition.* Retrieved 13 Apr 07, 2007, from http://eclectic.ss.uci.edu/~drwhite/Anthro179a/DistributedCognition.pdf.

Langan-Fox, J., Wirth, A., Code, S., Langfield-Smith, K., & Wirth, A. (2001). Analyzing shared and team mental models. *International Journal of Industrial Ergonomics, 28*, 99-112.

Levine, J. M., & Choi, H. S. (2004). Impact of personnel turnover on team performance and cognition. In E. Salas, & S. M. Fiore (Eds.), *Team cognition: Understanding the factors that drive process and performance*. Washington, D.C.: American Psychological Association.

Low, B. (2007). Mapping change management: A co-citation analysis. *Air Force Institute of Technology*.

MacMillan, J., Entin, E. E., & Serfaty, D. (2004). Communication overhead: The hidden cost of team cognition. In E. Salas, & S. M. Fiore (Eds.), *Team cognition: Understanding the factors that drive process and performance*. Washington, D.C.: American Psychological Association.

Mathieu, J. E., Heffner, T. S., & Goodwin, G. F. (2000). The influence of shared mental models on team process and team performance. *Journal of Applied Psychology, 85*(2), 273-283.

Merriam Webster's Online Dictionary. (2007). www.m-w.com

Ocasio, W. (2001). How do organizations think? In T. K. Lant, & Z. Shapira (Eds.), *Organizational cognition*. Mahwah, NJ: Lawrence Erlbaum Associates.

Okubo, Y. (1997). Bibliometric indicators and analysis of research systems: Methods and examples. *Organisation for Economic Co-operation and Development (OECD)*, 5.

Osareh, F. (Sept 1996). "Bibliometrics, citation analysis and co-citation analysis: A review of literature I." *Libri*, 46, 149-158.

Osareh, F. (Sept 1996). "Bibliometrics, citation analysis and co-citation analysis: A review of literature II." *Libri*, 46, 217-225.

Rentsch, J. R., & Woehr, D. J. (2004). Team member schema similarity revisited: A social relations perspective. In E. Salas, & S. M. Fiore (Eds.), *Team cognition:*

Understanding the factors that drive process and performance. Washington, D.C.: American Psychological Association.

Salas, E., & Fiore, S. M. (2004). Why team cognition? An overview. In E. Salas, & S. M. Fiore (Eds.), *Team cognition: Understanding the factors that drive process and performance*. Washington, D.C.: American Psychological Association.

Salas, E., & Fiore, S. M. (2004). Why we need *team* cognition. In E. Salas, & S. M. Fiore (Eds.), *Team cognition: Understanding the factors that drive process and performance*. Washington, D.C.: American Psychological Association.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (Fourth ed.). Boston, MA: Allyn and Bacon.

Thomson Scientific. (2007). *Social sciences citation index.* http://scientific.thomson.com/products/ssci/

West, C. J. (2004). Development of a conceptual framework of distributed cognition phenomena in control centers during crisis. Old Dominion University.

White, H. D., & Griffith, B. C. (1981). Author cocitation: A literature measure of intellectual structure. *Journal of the American Society for Information Science, 32*, 163-171.

Vita

Captain Ryan A. Howell graduated from Allegany High School in Cumberland, Maryland. He entered undergraduate studies at the United States Air Force Academy in Colorado Springs, Colorado where he graduated with a Bachelor of Science degree in Engineering Mechanics in May 2003. He was commissioned through the United States Air Force Academy where he was nominated for a Regular Commission. His first assignment was at Elmendorf AFB, AK, as the infrastructure engineer and a programmer in base development. While stationed at Elmendorf, he deployed overseas in August 2005 to Balad AB, Iraq as a project manager for the 332nd Expeditionary Civil Engineer Squadron. In August 2006, he entered the Graduate School of Engineering and Management, Air Force Institute of Technology. Upon graduation, he will be assigned to Mountain Home AFB, ID.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From – To)*
27-03-2008	Master's Thesis	August 2006 – March 2008

4. TITLE AND SUBTITLE

Bibliometrically Mapping Team Cognition Literature: A Co-citation Analysis

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Howell, Ryan A., Captain, USAF

5d. PROJECT NUMBER
N/A

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S)
Air Force Institute of Technology
Graduate School of Engineering and Management (AFIT/EN)
2950 Hobson Way, Building 640
WPAFB OH 45433-8865

8. PERFORMING ORGANIZATION REPORT NUMBER
AFIT/GEM/ENV/08-M10

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
This space intentionally left blank.

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Researchers investigating team cognition must source and review a challenging set of relevant, mature literature from a diverse array of academic disciplines. Such disciplines may include psychology, management, information science, military science, anthropology, and nursing science to name a few. This thesis summarized an effort to bibliometrically map team cognition literature using a co-citation analysis methodology. The work involved a traditional literature review identifying key authors publishing in peer reviewed journals. These authors were solicited to provide their own listings of key researchers which in-turn were used in conjunction with the Social Sciences Citation Index (*SSCI*) to construct a co-citation matrix of authors. Using factor analysis and multi-dimensional analysis techniques, visual maps were constructed that will highlight the seminality and influence of specific authors, relationships between authors, as well as branching and relationships of sub-domains in the literature over time. The goals of the research were 1) to provide team cognition researchers with a tool they can use to better inform their efforts and 2) to provide an explicit mapping of where the field has been and what new directions may be emerging.

15. SUBJECT TERMS
Team cognition, shared cognition, team mental model, author co-citation analysis, multivariate analysis

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Christopher J. West, Lt Col, USAF
U	**U**	**U**	**UU**	217	**19b. TELEPHONE NUMBER** *(Include area code)* (937) 255-6565, ext 7400

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39-18