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Team-Related Mental Representation: The Role of Individual Differences

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ABSTRACT – The current study applied Bowlby's (e.g., 1973) attachment theory in order to tap into several mechanisms underlying team-related mental representation. Attachment style of 89 subjects was evaluated via a self-report questionnaire, while their team-related mental representation was assessed through a sorting task. The findings revealed that attachment anxiety was associated with relative cognitive simplicity, whereas attachment avoidance was associated with low levels of mental differentiation. Also, avoidant persons manifested more negative content and less positive and instrumental content about teams. The discussion emphasizes the connection between the internalization of attachment experiences and the construction of team-related mental representation.

Over the past several decades, researchers studied ways by which team-related knowledge is processed and internally structured (Klimoski & Mohammed, 1994). The purpose of the current article is to explore the role of individual differences in the construction of team-related mental representation. Specifically, I followed recent studies (Rom & Mikulincer, 2003; Smith, Murphy, & Coats, 1999) that demonstrated the relevance of attachment theory within the team context and provided evidence for the effect of attachment style on team members' performance.

Attachment Theory and Research

Attachment theory (e.g., Bowlby, 1973) has been prominent in recent years as a theory of interpersonal relationships. Originally the theory was postulated in an evolutionary-ethnological perspective and gave rise to germinal ideas concerning the

evolved bonds between the infant and the primary caregiver. According to Bowlby (1973) the function of attachment behaviors is to provide the infant with security and protection. The attachment experiences are internalized into "*working models*", which can be viewed as mental representation of the self and the surrounding social world (Smith et al., 1999). These models, comprising the cognitive and affective patterns that constitute the particular attachment style, generalize into new relationships, create expectations about others, develop the self image, regulate distress, and fulfill crucial functions in other aspects of life (Collins & Read, 1994).

Following Bowlby's ideas, Hazan and Shaver (1987) examined attachment working models in adults, while utilizing the tripartite typology of infant attachment style initially formulated by Ainsworth, Blehar, Waters, and Wall (1978). Their work was consistent with Bowlby's (1973) claims arguing for high relevance of the attachment theory in predicting relational cognitions and behaviors across the entire life span. The seminal article by Hazan and Shaver (1987) identified three adult attachment styles, parallel to those found earlier by Ainsworth et al. (1978). Hazan and Shaver's classification of secure, avoidant, and anxious-ambivalent has been widely applied in numerous studies that explored adult close relationships (see Shaver & Hazan, 1993, for review).

Recently Brennan, Clark, and Shaver (1998) concluded that this typology reflects two basic dimensions of attachment insecurity: avoidance and anxiety. Persons scoring low on these two dimensions correspond to the *secure* style, which is characterized by a positive history of interactions with significant others, confidence in others' goodwill and their availability in times of need, and comfort with closeness, interdependence, and intimacy. Persons scoring high on attachment avoidance correspond to the *avoidant* style, which is defined by negative representation of others, compulsive self-reliance, and preference for emotional distance. These individuals are uncomfortable with intimacy, self-disclosure, and interdependence, and their tendency to rely on repressive and withdrawal strategies restricts their ability to maintain satisfactory close relationships. Persons scoring high on attachment anxiety correspond to the *anxious* style, which is characterized by profound doubts in others' good intentions, negative models of the self, compulsive desire for intimacy and closeness together with a strong fear of rejection. These individuals have intense need to be accepted, supported, and admired by their partners. However, their tendency to rely on emotional oriented strategies increases rather than decreases their internal distress.

Attachment research has repeatedly shown that self-report measures of attachment style have a major explanatory power tapping into a wide array of phenomena. To illustrate, attachment theory has been useful in explaining individual

differences in quality of close relationships (e.g., Feeney & Noller, 1990), attitudes toward love and work (e.g., Hazan & Shaver, 1990), affect regulation (e.g., Mikulincer, Florian, & Tolmacz, 1990), and daily social interactions (e.g., Pietromonaco & Barrett, 1997). Presumably, these individual differences stem from different mental organization (Collins & Feeney, 2000). While secure persons hold high integrative mental structures (Mikulincer, 1997), insecure persons' mental structures are characterized by disintegration, incoherence, and multiple contradictions (Mikulincer, 1995).

The present study further examined Bowlby's (1973) ideas that people rely upon their attachment experiences as a source of knowledge acquirement concerning the self perception and the appraisal of the social world. Although, the attachment theory has been mostly prominent as a theory of interpersonal relationships (Shaver & Hazan, 1993), contemporary studies (e.g., Rom & Mikulincer, 2003; Smith et al., 1999) indicated that the theory can shed light on group-related cognition, affect, and behavior. For example Rom and Mikulincer's (2003) found that persons scoring high on attachment anxiety manifested a deficit in their instrumental performance in actual teamwork sessions, whereas persons scoring high on attachment avoidance manifested a deficit in their socioemotional performance as well as in their instrumental performance during actual teamwork sessions. Assuming that to some extent this performance is guided by mental structures, I postulated that attachment style plays a role in the development of team-related mental representation.

Team-Related Mental Representation

Teams, in contrast to groups, are viewed as more structured and task-oriented social entities, with specific role assignments, higher levels of task interdependencies, and utilization of intensive communication (Dyer, 1984). Since, team members often face extreme conditions of time pressure, complex and multifaceted tasks, and rapidly evolving and changing information (Orasanu & Salas, 1993), it has been argued that the next frontier in teams' research must capture cognitive phenomena (Paris, Salas, & Cannon-Bowers, 2000). Indeed, in recent years attempts to employ a cognitive approach to the study of teams have gained support (e.g., Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Rentsch, Heffner, & Duffy, 1994). In particular, there has been an upsurge of interest in the concept of *team mental models* (Carley, 1997), which was developed to help account for performance differences in teams (Mohammed & Dumville, 2001).

The general notion of team mental models was introduced by Cannon-Bowers, Salas, and Converse (1993) as a comprehensive term that can advance our understanding of teams' performance. It was postulated that these mental

representations can account for the fluid and implicit coordination frequently observed in effective teams (Mohammed & Dumville, 2001). When members hold compatible mental models of task requirements, other team members, and situations, higher team performance can be expected since synchronization, coordination, and communication among teammates is improved (Rouse, Cannon-Bowers, & Salas, 1992). Nonetheless, Banks and Millward (2000) maintained that team mental models rely upon the team-related mental representation of individual team members. Thus, a special emphasis should be given to the individual-level of analysis in order to explore how the team concept is internally represented in the mind of individuals.

The literature suggests that people may hold specific and concrete knowledge of their particular team, the specific teammates involved, and the specific task they ought to accomplish (e.g., Smith-Jentsch, Campbell, Milanovich, & Reynolds, 2001), while simultaneously they possess core knowledge concerning teams in general. This general knowledge encompasses global themes of teams such as cooperation, communication, and commitment (Rentsch et al., 1994). Although this knowledge is team-related, it is not team-specific. Rather, it acts as generic knowledge that can be applicable to various teams. It is this core knowledge that was the main interest of the current study, although I did not employ a complete context-free approach. Specifically, I explored individuals' mental representation concerning command-and-control teams. These teams are characterized by rapidly changing situations with limited time available and with tasks that are strictly organized (Cannon-Bowers et al., 1993), and include military units, fire-fighting teams, emergency medical teams, and cockpit crews (Jones & Roelofsma, 2000).

To date, most of the studies that examined individual-level processes in team-related mental representations have observed demographic variables and team experience (e.g., Rentsch et al., 1994; Rentsch & Klimoski, 2001). Although individual differences were proposed as vital factors in the establishment of team-related mental representation (e.g., Cannon-Bowers et al., 1993; Klimoski & Mohammed, 1994), to the best of my knowledge this argument has never been tested empirically. Hence, in the current study I applied adult attachment theory in order to better understand individual differences in team-related mental representation.

The Current Study

Consolidating attachment theory, that focuses mainly on emotional bonds, and teams, that are mostly considered as a work-related concept, is not that straight forward. However, different studies demonstrated potential linkages between the two. For example, Devine (1995) showed that people seek the proximity of other group members in times of need, and Mullen and Cooper (1994) demonstrated that

the group can be a source of support, comfort, and relief mainly during demanding situations. Further more, contemporary studies (e.g., Rom & Mikulincer, 2003) confirmed that teams can fulfill the definitional criteria of attachment bonds and that the particular attachment style the individual possesses plays a significant role in his or her behavior during actual teamwork sessions. On this basis I postulated that attachment style can be associated with team-related mental representation.

It was hypothesize that attachment dimensions (i.e., anxiety and avoidance) are manifested in team-related concepts. First, theory and research on small groups have delineated two basic dimensions of an individual's performance in groups: (a) *soicioemotional functioning* – the extent to which a person contributes to the morale and cohesion of the group, and (b) *instrumental functioning* – the extent to which a person contributes to the group tasks and goal accomplishment (e.g., Barry & Stewart, 1997). In addition, Cannon-Bowers and Salas (2001) suggest that team mental models apparently hold negative and positive contents that reflect beliefs and attitudes team members hold towards their team. In order to examine the notion that these team-related concepts are associated with attachment dimensions the following set of hypotheses was drawn and tested.

Hypothesis 1a. Attachment insecurity (i.e., avoidance and anxiety) would be manifested in team-related instrumental and socioemotional content. Specifically, whereas attachment anxiety would be associated with less instrumental adjectives, attachment avoidance would be associated with less socioemotional and instrumental adjectives.

Hypothesis 1b. Attachment insecurity would be manifested in team-related negative content.

Hypothesis 2a. Attachment insecurity would be negatively associated with team-related mental differentiation (i.e., the number of aspects which a person uses for organizing knowledge and the degree of distinctiveness), operationalized as number of adjectives used to describe team-related knowledge.

Hypothesis 2b. Attachment insecurity would be negatively associated with team-related mental integration (i.e., the development of connections among differentiated aspects), operationalized as number of categories used to describe team-related knowledge.

Hypothesis 2c. Attachment insecurity would be negatively associated with team-related cognitive complexity, operationalized as number of cognitive dimensions used to describe team-related knowledge.

Method

Participants

Eighty-nine Israeli undergraduates (65 women and 24 men ranging in age from 19 to 27, *Mdn* = 23) participated in the study as part of the requirements for their degree. All subjects had previous experience in command-and-control teams. No significant gender differences were found in all the assessed variables and no significant interactions of gender with attachment scores in predicting any of the team-related variables.

Instruments and procedure

The study was run in two sessions. The first session was conducted during regular class time and participants completed Mikulincer et al.'s (1990) 10-item scale tapping attachment anxiety and avoidance in close relationships (5 item per dimension). Items were constructed based on Hazan and Shaver's (1987) descriptions of how people feel in relationships and correspond to Brennan et al.'s (1998) relevant dimensions. Participants were asked to think about their close relationships, without focusing on a specific partner, and to rate the extent to which each item described their feelings and cognitions in these relationships on a 7-point scale, ranging from 1 "*not at all*" to 7 "*very much*". In the current sample, Cronbach's Alpha for the anxiety dimension was .74, and for the avoidance dimension was .78. Then two scores were computed by averaging the relevant items.

The second session was conducted two weeks later in a laboratory by a different research assistant, who was unaware of the participants' attachment scores. Subjects were asked to think of a command-and-control team they have been a part of during their military service (e.g., tank crew, combat ship team) and to sort a set of 100 team-related adjectives (e.g., cooperation, productivity, and creativeness) with respect to this team[1]. These adjectives represented unique descriptors of teams and have been validated and applied previously to tap team-related mental representation (e.g., Retsch et al., 1994). At first, participants were asked to mark the adjectives that they find relevant and to sort them into different categories. They could form as many categories as they wished, and there was no limitation for the number of words in each category. Next, they were asked to produce a list of all possible pairs of categories and to rate their semantic similarity using a 7-point scale ranging from 1 "*very dissimilar"* to 7 "*very similar*".

Preliminary analyses

In order to assess subjects' team-related mental representation several preliminary analyses were followed.

1. *Team-related content*. Four research assistants, who were unaware of the study's hypotheses and experts in teams (i.e., team trainers), were asked to divide the 100 adjectives twice. First, splitting them to positive (e.g., acceptance, creative) and negative (e.g., frustration, apathetic) adjectives. Second, splitting them to socioemotional (e.g., friendly, unity), and instrumental (e.g., plan, standard) adjectives. Next, they analyzed each participant's list and divided his/her chosen adjectives into the positive/negative and the socioemotional/instrumental groups. Each group represented a different attitude about teams. Then 4 scores were computed by summing the number of adjectives in each attitudinal group.

2. *Team-Related organization*. In order to assess team-related mental organization several variables were calculated.

2.1 *Total number of adjectives*. A summary of the number of adjectives that participants indicated as relevant. This measure gave rise to the degree of mental differentiation (i.e., the more adjectives used, the more diverse is the mental representation).

2.2 *Number of categories*. A summary of the numbers of categories that participants assembled. This measure gave rise to the degree of integration (i.e., the fewer categories created, the more integrated the mental representation).

Multidimensional scaling (MDS). For each subject a matrix was arranged containing the similarity rating of each pair of categories. Participants' ratings of similarities were subjected to MDS analysis resulting in a spatial representation of their knowledge (Schiffman, Reynolds, & Young, 1981). The assumption underlying this analysis is that the more complex the subject's thinking, the more dimensions are required in order to properly describe his or her knowledge structure. The dimensionality score for each participant was determined by the minimal number of dimensions needed to reach the criteria of Stress < .20 (the most frequently used MDS index that indicate goodness of fit between the similarity matrix and the spatial representation of the matrix). Based upon this procedure, a dimensionality score was computed.

Results

Descriptive Statistics

Intercorrelations and descriptive statistics for attachment dimensions and team-related variables are presented in Table 1. As seen from the table, while attachment anxiety correlated significantly only with the number of dimensions as obtained from the MDS procedure, attachment avoidance correlated significantly with positive, negative, and instrumental adjectives, and with the total number of adjectives

selected by the subject. Positive adjectives were positively correlated with socioemotional adjectives and negatively with instrumental adjectives, while negative adjectives were negatively correlated with socioemotional adjectives and positively with instrumental adjectives. As expected, negative and positive adjectives were negatively correlated, as well as the socioemotional and instrumental adjectives.

Table 1
Zero-Order Correlations and Descriptive Statistics of Attachment Dimensions and Team-Related Variables

Variable	1	2	3	4	5	6	7	8	9
1. Attachment Anxiety	-								
2. Attachment Avoidance	.28	-							
3. Positive Adjectives	.03	-.25*	-						
4. Negative Adjectives	.09	.12*	-.92**	-					
5. Socioemotional Adjectives	.07	-.11	.89**	-.24*	-				
6. Instrumental Adjectives	.03	-.26*	-.27**	.30**	-.97**	-			
7. Number of Adjectives	.05	-.21*	.98**	.38**	.93**	.97**	-		
8. Number of Categories	-.00	.05	.11	.05	.14	.09	.12	-	
9. Number of Dimensions	-.26*	-.13	.08	.01	.08	.07	.08	.59**	-
M	2.40	3.20	40.30	4.02	20.08	24.22	44.30	3.54	2.15
SD	1.02	1.13	15.09	3.18	7.03	9.83	16.03	1.71	1.04

Note: *$p < .05$; **$p < .01$

Concerning the team-related mental representation, the MDS procedure revealed that by an average a two dimensional solution appeared to best represent the subjects' cognitive complexity, where the minimum number of dimensions obtained was 1, and the maximum was 4. In addition, the number of dimensions was positively correlated with the number of categories the subjects assembled.

Test of Hypotheses

In order to examine the research hypotheses, several regression analyses were conducted, testing the unique effects of attachment anxiety and attachment avoidance. The analyses revealed that the set of unique effects of the predictive factors made significant contributions to the predicted variables and explained between 4% and 8% of their variance (see Table 2).

With regard to team-related content, regression coefficients revealed the following pattern of findings: Whereas attachment anxiety did not have any significant effect on team-related content, attachment avoidance made a significant unique effect on positive, negative, and instrumental content. These results partially support hypotheses 1a, and 1b. Specifically, the higher the attachment avoidance the

higher the negative content and the lower the positive and instrumental content about teams.

With regard to team-related mental organization, regression coefficients revealed the following pattern of findings: Whereas attachment anxiety had a significant unique effect on number of dimensions (as obtained from the MDS procedure), attachment avoidance had a significant unique effect on number of adjectives selected by the participants. These results partially support hypotheses 2a, and 2c. Specifically, the higher the attachment avoidance, the lower the mental differentiation as manifested in the number of adjectives selected by the subject. In addition, the higher the attachment anxiety the lower the cognitive complexity, as manifested in the number of dimensions needed to best describe the subject's mental representation. Finally, hypothesis 2b did not receive any support since attachment insecurity did not make any significant correlations with team-related mental integration.

Table 2
Standardized Regression Coefficients, F-tests, and Strength of the Contribution of Attachment Anxiety and Attachment Avoidance to Team-Related Variables

Measure	Beta Attachment Anxiety	Beta Attachment Avoidance	Overall $F(2,86)$	R^2(%)
Positive Adjectives	.11	-.28*	3.32*	7
Negative Adjectives	.10	.26*	7.62*	4
Socioemotional Adjectives	.11	-.14	1.00	2
Instrumental Adjectives	.11	-.29**	3.78**	8
Number of Adjectives	.12	-.24*	2.56*	6
Number of Categories	-.01	.05	.09	2
Number of Dimensions	-.24*	-.06	3.22*	7

Note: *$p < .05$; **$p < .01$

Discussion

Overall, the current study supports the view that attachment-style differences are manifested in a person's team-related mental representation, although not all findings were in line with the specific predictions. Hence, the current study represents the usefulness of applying attachment theory and measurement to the field of teams.

With regard to attachment anxiety, the current findings only partially confirmed the research hypotheses. Specifically, attachment anxiety was negatively associated with cognitive complexity. This finding replicates previous studies (e.g., Collins &

Read, 1994; Mikulincer, 1995) that demonstrated poorly developed, simplistic, and shallow mental structures commonly held by anxious individuals. It appears that these individuals' preoccupation and excessive use of emotional oriented destructive strategies (Mikulincer, 1998) constrained them from developing complex mental representation. In other words, their cognitive organization is greatly affected by their difficulties in regulating distress. Presumably, this deficit in cognitive complexity affects anxious persons' behavior in actual teams as recently been reported by Rom and Mikulincer (2003).

With regard to attachment avoidance, the current findings also partially confirmed the research hypotheses. Specifically, attachment avoidance was positively associated with negative team-related content and negatively associated with positive and instrumental team-related content. Also, attachment avoidance was negatively associated with team-related mental differentiation. These findings fit basic known components of avoidant persons' mental representation (e.g., Collins & Read, 1994), and their basic tendency not to value social relationships (Shaver & Hazan, 1993). Thus, the negative associations with positive content and the positive association with negative content can be ascribed to a pessimistic and depressive orientation of these individuals, as been found in previous research (e.g., Mikulincer, 1995). The negative association with instrumental content can be attributed to the dismissing attitude of avoidant persons towards social interactions (Rom & Mikulincer, 2003). Last, the low mental differentiation is consistent with previous findings suggesting a deficit in avoidant persons' mental organization (e.g., Mikulincer, 1995).

It seems that avoidant persons' team-related content reflect a manifestation of their dismissal of the potential benefits embedded in teamwork. In particular, although avoidant persons attempt to dismiss the importance of social interactions, this suppressive strategy may fail to prevent the arousal of negative feelings towards the team concept. Rom and Mikulincer (2003) suggested that during socially intense situations, the avoidant persons' denial and distance mechanism collapse, thus causing negative fillings to arise, overwhelm and demolish their pseudo-secure facade. During teamwork sessions, where no teammate can deny the interdependency nature of the situation, avoidant persons' natural suppressive mechanisms simply cannot be applied. Presumably, this pattern of findings affects avoidant persons' socioemotional and instrumental performance during actual teamwork sessions as recently demonstrated by Rom and Mikulincer (2003).

Before concluding this discussion, it is appropriate to note some specific limitations of the current study. First, the subjects that participated in the current sample were all undergraduate Israeli students. Hence, the findings should be

replicated among other cultural religious samples also extending the age and socioeconomic background. Second, the study's participants were not part of organic teams, thus their driven teamwork knowledge did not stem from common team-related experiences, but rather were a manifestation of their individualistic idiosyncratic life experiences. Naturally, this limits the general application of the research to actual organizations. Future studies should be conducted among actual organic working teams. Third, the study intentions were to tap into a core team knowledge that applies to most command-and-control teams. Although there are certainly generic components in the team concept regardless of the particular task or team, future research should strive for a better understanding of the diverse as well as the common teamwork characteristics. Fourth, the current study assessed team-related content only through a list of adjectives, and the cognitive organization measures did not delineated degree of coherence. Future research should develop more complex and specific measures of team-related cognition. Despite these possible limitations, the current study supports the notion that attachment theory is a relevant framework for investigating team-related mental representation, and contributes to the conceptual and empirical integration of the field of teams and interpersonal relationships.

Footnote

[1] The list was obtained from Rentsch and Howe (1990), and was translated into Hebrew by two bilingual psychologists. Items were then translated back into English to assure that the translation was accurate.

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