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Emotions and Decision-Making Processes in Management Teams: A Collective Level Analysis

Emociones y Procesos de Toma de Decisiones en Grupos Ejecutivos: un Análisis Colectivo

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Abstract. Discrete emotions are rarely studied in relationship with group decision-making. Using data from 20 simulated companies run by a total of 106 managers attending executive education programs, the current research examined to what extent four classes of emotions (positive achievement, positive approach, negative resignation, and negative antagonistic) were related to team decision-making processes (alternative generation and alternative evaluation). Significant intra-class coefficients confirmed that aggregation of emotion and decision-making processes was feasible. Correlations at the collective or aggregated team level showed that approach emotions were related to alternative generation, particularly in the developing phase of a group decision-making task. Finally, a ratio of positive emotions over negative emotions correlated positively with a better team decision process. Future research extending emotion influence in decision process is suggested, and practical implications are discussed.

Keywords: emotion, teams, decision-making processes, collective analysis.

Resumen. Las emociones específicas se han estudiado poco en relación a la toma de decisiones. Utilizando los datos de 20 compañías simuladas en juego de roles por 106 directivos que asistieron a programas de formación para ejecutivos, este estudio examina en qué medida cuatro clases de emociones (positivas de logro, positivas de aproximación, negativas de resignación, y negativa de antagonismo) se asocian a procesos de toma de decisión en equipo o grupales. Coeficiente intra-clase significativos confirmaron la factibilidad de agregar en media grupales tanto las emociones como los procesos de toma de decisiones. Correlaciones colectivas o realizadas con las puntuaciones agregadas al nivel de equipo de trabajo mostraron que las emociones de aproximación se asociaban a la generación de alternativas, particularmente en la fase de desarrollo de una tarea de toma de decisiones en equipo. Finalmente, una ratio de emociones positivas sobre negativas correlacionó positivamente con un buen proceso de toma de decisiones. Nuevas investigaciones ampliando el estudio de la influencia de las emociones en los procesos de decisión se plantean, así como se discuten las implicaciones prácticas del estudio.

Palabras clave: emoción, equipos de trabajo, procesos de toma de decisiones, análisis colectivos.

Several decision-making scholars have commented about the deficiency of research on affect/mood/emotion and group decision-making (e.g. Hinsz, Tindale, & Vollrath, 1997); although there has been interest in the role of emotions in decision-making at the individual level over the last decade (Loewenstein & Lerner, 2003). Organizational researchers have called for more research addressing discrete emotions (Brief & Weiss, 2002), as opposed to mood or affect. Yet, despite recent efforts to study multiple forms of collective affect and their influence on organizational processes (e.g. Barsade, 2002; George, 1990), very little empirical work has been done on collective emotion in relationship with team decision-making processes. The purpose of this article is to examine the extent to which

emotions at the team level are related to group decision-making processes, such as generating and evaluating alternatives.

Affect and decision-making

At the individual level of analysis, positive affect has been consistently demonstrated to enhance creativity and efficient decision-making (Isen & Baron, 1991, Staw & Barsade, 1993). Positive mood enhances fast decision-making, based on heuristics and routine information processing (Forgas & George, 2001), activated when the situation is safe (Schwarz, 2000). In contrast, negative mood is supposed to enhance detail, careful, systematic information processing, including a comprehensive and critical evaluation of alternatives (Schwarz, 2000), which is considered to improve decision quality.

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At the group level of analysis, studies in the group decision-making literature have accounted for the affective side of teamwork. Heath and Jourden (1997) found that group activity enhances positive affect (what they describe as “the enthusiasm effect”) but more importantly it buffers moderates team members from translating the negative affect generated by post-performance disillusionment into negative performance evaluations. Still, studies looking at the effect of discrete emotions on decision-making at the team level are sparse.

Classes of emotions

Emotion is event/object specific (Lazarus, 1991), has usually a definite cause and a cognitive content (Forgas & George, 2001) as well as an action tendency or state of readiness to execute a given kind of action. Action tendencies are a relevant feature of emotion when it comes to understanding potential or actual behaviors (Frijda, 1986). These actual behaviors in turn impact the relationships one has with others, as others will react according to the signals they perceive. This aspect of mutual influence between an individual's emotions and the other party's attitudes or actions is important when considering emotions occurring in a team context. In this study, emotion is the concept of choice, not mood nor affect.

Scherer (1994) proposes the term of “modal” emotions, defined as the outcomes of frequently occurring patterns of appraisal or else, prototypical patterns of appraisal. Certain emotions share similar patterns of appraisal, including action tendencies, and behavioral consequences, thus it is posited that these emotions can be grouped in classes. The concept of classes of emotions was initially proposed by Scherer & Tran (2001) to describe the impact certain emotions could have on organizational learning. Four classes of modal emotions were adapted: (1) positive emotions of achievement (for example pride, elation, joy, satisfaction); (2) positive emotions of approach (for example relief, hope, interest, surprise); (3) negative emotions of resignation (for example sadness, fear, shame, guilt); and (4) negative emotions of antagonism (for example envy, disgust, contempt, anger). This is not to suggest that the particular emotions mentioned here are the only ones that are covered by the four classes, but they have been selected as examples because they represent modal emotions.

Emotions and Team Decision-Making

Empirical research considering both the effects of emotion as defined above (i.e. a dynamic process, object or event related, limited in its duration, with specific action tendencies and behavioral conse-

quences), and of collective emotions, on group decision-making is still needed.

The particular focus in this study is strategic decision-making observed in a naturalistic decision-making framework, which is characterized by ill-structured problems, uncertainty, dynamism, shifting of competing goals, time stress, high stakes, multiple player, and organization goals and/or norms (Zsombok & Klein, 1997). A strategic decision is defined as an important decision that deals with complex and ambiguous issues, and requires the commitment of a large amount of resources from the organization (Amason, 1996; Mintzberg, Raisinghani, & Théorêt, 1976). The complexity and ambiguity surrounding a strategic decision is usually too overwhelming for only one person do deal with it, thus strategic issues are often handled by top management teams (Schweiger, Sandberg, & Rechner, 1989).

Two main decision-making processes were identified: (a) the generation of alternatives, which represents the most creativity-oriented process; and (b) the evaluation of alternatives, which represents the analytical dimension of decision-making.

Alternative generation is the ability of team members to generate as wide a range of alternatives and as great a number of alternatives as they can, in order to avoid being psychologically entrapped in too narrow a decision and to ensure no meaningful element has been overlooked which would have potential negative consequences for the quality of the decision (see Eisenhardt, 1989; Hackman & Morris, 1983; Janis, 1982, 1989; Paulus & Yang, 2000). Approach emotions are associated with creative activities, accompanied with intellectual curiosity and energy; exploring behaviors are stimulated and probably are related to alternative generation. Achievement emotions occur in situations when people have a sense of accomplishment, personally or professionally, and a desire to celebrate successes with others (Izard, 1991; Lazarus, 1991; Scherer and Tran, 2001). Achievement emotions enhance flexible thinking, creativity, and openness. Research on affect and decision-making has demonstrated that positive affect or mood, which is operationalized in studies with verbal labels such as “happy” or “elated”, enhance cognitive flexibility, creative thinking, innovation, and broader information search. In conclusion.

Hypothesis 1: Achievement and Approach emotions will be positively related to alternative generation.

Resignation emotions are associated with the narrowing of thoughts, with tunnel vision, ruminations over the same thoughts, lack of confidence, and little innovation (Izard, 1991). Research on emotion and decision-making suggests that individuals feeling fear are more pessimistic about future events (Lerner & Keltner, 2000) and that sad individuals overestimate

the likelihood of negative outcomes (Schwarz, 2000). It appears that under the influence of resignation emotions, team members will have difficulty to propose a wide range of innovative alternatives. Antagonistic emotions are triggered when team members feel they have been treated unfairly, or harm as been done to them, or their goals have been threatened. Thus, antagonistic emotions encourage mobilization and ideas of retaliation. Team members remain very focused on the object of revenge and have a strong desire to reinstate their threatened goals. Given that the attention is centered on a narrow range of targets, it is unlikely that team members will generate alternatives outside of the scope of their revenge. Concluding:

Hypothesis 2: Resignation and Antagonistic emotions will be negatively related to alternative generation.

Alternative evaluation is as thorough an examination of the alternatives as possible, and an analysis of the costs and benefits of each alternative, thus preventing team members to ignore relevant information, to limit their discussions to only a few alternatives, and to take the risk of deciding too hastily (see Aldag & Fuller, 1993; Johnston, Driskell, & Salas, 1997). Achievement emotions may lead to boastful actions with low concentration and a slowing down of productive thinking. Research on positive mood has demonstrated that it is associated with the use of simpler decision rules, with little attention paid to details, and a tendency to overlook important information or to underestimate the likelihood of negative outcomes. Thus:

Hypothesis 3a: Achievement emotions will be negatively related to alternative evaluation.

Approach emotions occur in situations when people are attentive, alert, exploring, wanting to learn, and looking forward to the future (Frijda, Kuipers, & ter Schure, 1989; Izard, 1991; Lazarus, 1991). Approach emotions induce vigilance, mobilization, and persistence even in tedious tasks. Team members may be ready to expand effort if necessary. Research in affect and decision-making has demonstrated that if individuals are interested and motivated, and if they consider the task personally relevant to them or to their team, they will engage in thorough, systematic, and effortful analysis of the situation. Thus:

Hypothesis 3b: Approach emotions will be positively related to alternative evaluation.

Resignation emotions promote the possibility to review team objectives realistically, and to think carefully about risks. Research on mood and group decision-making suggests that negative mood (i.e., sad mood) leads team members to proceed to a thorough

analysis of the situation. Research on affect or mood and decision-making concurs as it consistently demonstrates that negative mood (i.e., sad mood) enhances considerable attention to details and a careful, step-by-step analysis of alternatives. Research on group decision-making indicates that a reasonable level of shame or guilt encourages decision-makers to revise their decisions (Janis, 1989). Thus:

Hypothesis 4a: Resignation emotions will be positively related to alternative evaluation.

Antagonistic emotions occur in situation when people feel inferior or humiliated (Izard, 1991), or think theirs or themselves have been harmed, morally or physically, and that the cause of this harm is unfair (Izard, 1991; Lazarus, 1991). Antagonistic emotions enhance aggressiveness, which could nurture a blind desire for retaliation and potential fighting (Scherer & Tran, 2001). Antagonistic emotions are held responsible for defective decision-making, as demonstrated by research on group decision-making (e.g. Janis, 1989). When motivated by retaliation or aggression, team members may not take the time to weigh the consequences of their decisions. Thus,

Hypothesis 4b: Antagonistic emotions will be negatively related to alternative evaluation.

Finally, as Fredrickson argues or points out, positive emotions broaden and build psychological and social resources. Thus, a dominance of positive over negative emotions is adaptive. Losada (1999, quoted in Fredrickson, 2009) found that high performance business teams showed higher positivity ratios, that is a higher level of positive over negative emotional interactions than middle level or low performance teams. As previously exposed, positive approach emotions may influence alternative generation and evaluation more consistently. Thus:

Hypothesis 5. A positive emotions/negative emotions ratio will be positively related to decision-making. Specifically, positive approach emotions over negative will be associated to a perceived improved decision-making process (i.e., alternative generation and alternative evaluation).

Method

Participants

The participants were 106 managers, 96 males (90.6%) and 10 females (9.4%) taking part in executive development seminars. The participants attended the seminars in classes of successively 27, 23, 32 and 24 persons in each class, and came from 3 different

multinational organizations in total. The participants were selected by their top management to attend the seminars. The average age was 33.85 ($SD = 5.37$) for the total sample, ranging from 25 to 51 years. Twenty nationalities were represented in total. Heterogeneous teams were formed before the seminar started, with 4 to 7 participants per team ($M = 5.3$); the total number of teams was 20. The objective was to obtain the widest mix of nationalities, of functions and of business units, to ensure a balance of backgrounds, and at the same time to avoid having either too many participants of the same function or too many specialists in any of the particular functions (Fandt, Richardson, & Conner, 1990). Heterogeneous teams have been shown to be more effective and to make higher-quality decisions when dealing with non-routine, complex problems (Amason, 1996; Sniezek, 1992). Team members operated as a self-managed team, acting as a board of directors of the company they have to manage during the business simulation, which was a main learning component of the seminar, and during which the decision-making processes were studied.

Measures

Self-report measures were used for both the independent and the dependent variables. Verbal reports of emotion represent a common methodology. Although they are based on subjects' memories and conscious subjective feeling (Ellsworth & Scherer, 2003), there is no other way to access experience (Scherer, 2005). As far as decision-making variables are concerned, self-report measures are used in research on group decision-making or strategic decision-making (e.g., Dooley & Fryxell, 1999). In the case of teams operating in an uncertain and complex environment, it is difficult to evaluate the quality of a decision objectively as criteria can vary from context to context (Amason, 1996). Thus, the group's own evaluation may be the best way of assessing the decision-making processes retrospectively (Amason, 1996; Sniezek, 1992).

Classes of emotions. The four classes of emotions (achievement emotions, approach emotions, resignation emotions, and antagonistic emotions) were measured with the Emotion Wheel (see Figure 1). The Emotion Wheel was designed to represent quality and intensity of emotions, organized along two dimensions, with its advantage as a practical data collection instrument (Tran, 2004, for a description of its validation; Scherer, 2005). This paper-and-pencil instrument includes 16 modal emotions in total (four emotions per class of emotion), and each emotion can be rated on four levels of intensity, on a scale from 1 (lowest intensity, close to the origin) to 4 (strongest intensity, at the perimeter). The emotions are organized along two appraisal dimensions selected from Scherer's (1984)

Stimulus Evaluation Checks (SECs), Pleasantness/Unpleasantness, and Low Control/High Control, in a circular form, each emotion with its four levels of intensity forming a radiant.

Decision-making processes. A four-item scale assessed *alternative generation*. For example, "How many alternatives do you think your team generated, compared to what one would expect?" (0 = less than expected, 9 = more than expected), or "To what extent do you think your team generated non-obvious alternatives?" (0 = not at all, 9 = a lot) were such items. The internal-consistency coefficient for the scale, Cronbach's alpha, reached of .66 at Time 1 and .62 at Time 2. In consequence, the four items were averaged to produce a scale score.

Alternative evaluation was measured with three items, for example "To what extent do you think your team may have thoroughly reviewed all alternatives before making the decision?" (0 = not reviewed, 9 = thoroughly reviewed), or "To what extent did you look at the cost and benefits of the alternatives you finally considered?" (0 = did not look, 9 = looked extensively). The three items were averaged to produce a scale score. Cronbach's alpha reached .60 at Time 1 and .69 at Time 2.

Participants rated their responses on a 10-point Likert-type scale (0-9) at 2 points in time. Internal-consistency coefficients for the two scales, Cronbach's alphas, are provided in Table 1. The alternative evaluation scale was reduced to 3 items after an insufficient alpha had been revealed with the initial 4 items. Decision-making variables were operationalized as a group-level construct, by anchoring the questions around the term "team" (see Chan, 1998; Tesluk, Mathieu, Zaccaro, & Marks, 1997).

Task

The business simulation used in the present study was designed to help participants see the integration of different functions and competencies necessary to run a multinational organization. It is a complex, large-scale simulation that requires complex decision-making strategies to deal with multiple inputs, unpredictable events, and competing groups. Simulations have been identified as being efficient and pivotal in the development of managers, because they provide a viable and cost-effective means to develop managers in realistic, but non-threatening situations (Thornton-III & Cleveland, 1990).

The simulation program called Topsim-EURO (developed by Unicon GmbH, Meersburg, Germany), is designed to integrate decision-making across functions (marketing, sales, R&D, production, logistics, and finance). The underlying computer program contains more than 7000 sigmoid equations. These curves combined with each individual team's decisions permit

Figure 1. The Emotion Wheel and an example of a team's emotional map during the first period of simulation

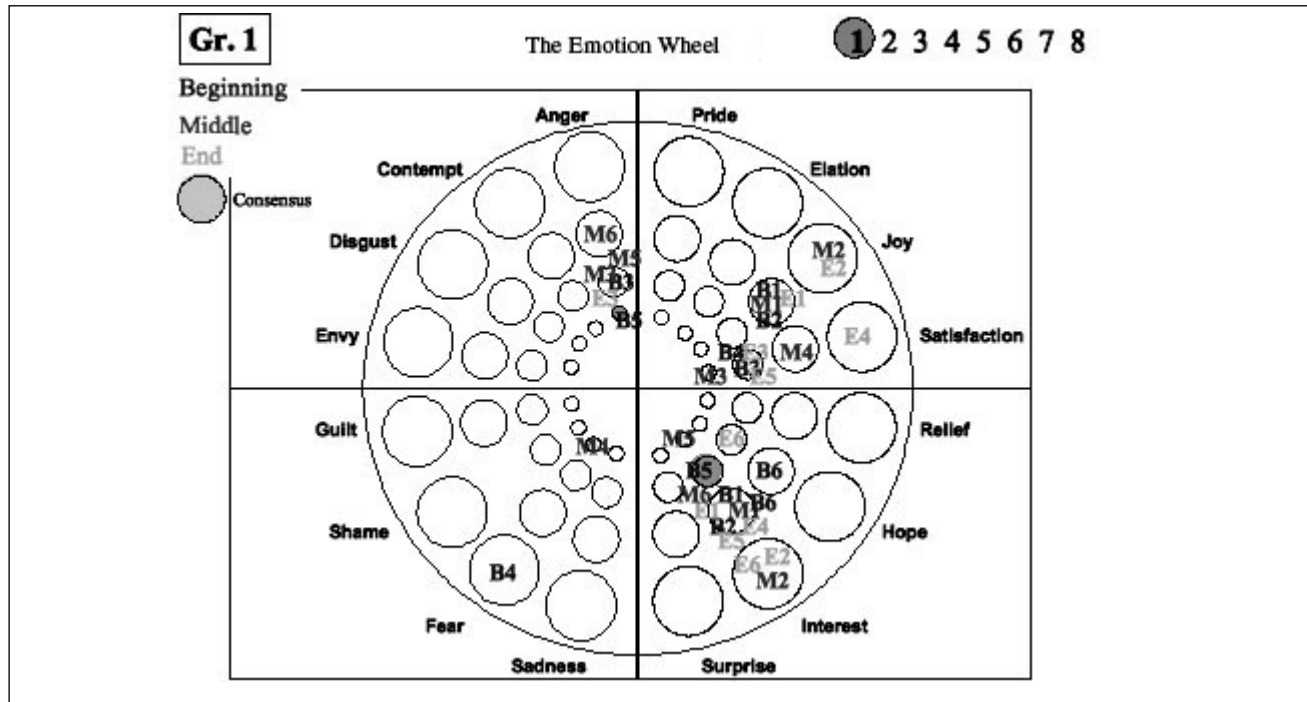


Table 1. Intraclass Coefficients and Interrater Reliability Coefficients for Classes of Emotions

	ICC	Median IRR	
Achievement emotions			
Mean Overall	.30***	.98	
Mean Starting Phase	.33***	.98	
Mean Developing Phase	.25***	.97	
Last of Starting Phase	.31***	.97	
Last of Developing Phase	.22**	.95	
Approach emotions			
Mean Overall	.46***	.98	
Mean Starting Phase	.35***	.97	
Mean Developing Phase	.44***	.98	
Last of Starting Phase	.12**	.96	
Last of Developing Phase	.24**	.96	
Resignation emotions			
Mean Overall	n.s.	1.00	n = 15 teams
Mean Developing Phase	.10 ⁺⁺	1.00	n = 11 teams
Antagonistic emotions			
Mean Overall	.14*	1.00	n = 10 teams
Mean Developing Phase	.15*	1.00	n = 8 teams

Note. ns = non significant. ⁺⁺ $p < .25$ (liberal criterion for significance, recommended by Kenny and La Voie (1985); ⁺ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

almost an infinite array of alternative outcomes. Thus, each team was challenged to generate as many alternatives as possible and perform numerous “what-ifs” during each decision period.

Procedure

Participants managed a company during 8 fictitious years. Each fictitious year lasted between 3 and 3 ½

hours, and was called a *decision period*. During each period P, participants made strategic (long-term effects and organizational goals), tactical (medium-term effects), and operational decisions (short-term effects and routine decisions) (Nutt & Wilson, 2010). Before the start of the next decision period, teams received a report that is the equivalent of real organizations’ annual reports, containing all relevant financial figures.

For each decision period, each team received an A4 Emotion Wheel to record their team emotion; the indi-

vidual scoring sheet included 3 small Emotion Wheels, one for each time of measurement. At the *beginning* of each decision period, participants selected 2 emotions reported on the Emotion Wheel “B”. At the *mid-point* of the decision period, they selected 2 emotions on the Emotion Wheel “M”. At the *end* of the decision period, they selected 2 emotions on the Emotion Wheel “E”. The sheet included a few lines for additional comments. The criterion for selecting the two emotions was their degree of importance for the participant.

The survey measuring decision-making processes was administrated to participants between the second and the third decision periods (Time 1), when the teams had worked together for two times three to four hours, and a second time between the sixth and the seventh decision periods (Time 2), when the teams had worked together for four more times three to four hours. This last period represents the final and an important proxy of the decision making process.

Overview of analyses

One-tailed bivariate correlations¹ were performed, as the purpose of this study is to determine the extent to which the four classes of emotions may relate to decision-making processes. Data were analyzed at the aggregated team level (individual scores averaged by team, emotion and decision-making) over all decision periods (i.e. variables called Mean Overall).

To ensure the feasibility of aggregation to the team-level, two measures of within-group agreement were used (e.g., Bartel & Saavedra, 2000; Edmondson, 1996). The first measure is the intraclass correlation coefficient (ICC) (Kenny and La Voie, 1985), and the second measure is the interrater reliability coefficient (IRR) (James, Demaree, and Wolf, 1984).

Classes of achievement and approach emotions yielded significant ICC values, ranging from .12 to .46 ($p < .01$ to .001), as shown in Table 1. ICCs for negative emotions scores could not be calculated when there were not enough respondents reporting negative emotions per team, rendering the calculation of an intra-group coefficient irrelevant. The ICC reached statistical significance for Mean Scores of resignation emotions in the Developing Phase (.10) at a $p < .25$ level, which is a liberal criterion for significance suggested by Kenny and La Voie (1985). ICCs for antagonistic emotions reached statistical significance respectively in the case of Mean Overall Scores (.14) and of Means Scores in the Developing Phase (.15), at a $p < .05$ level.

The interrater reliability coefficient (IRR) (James et al., 1984) compares actual variance to a measure of “expected variance” to assess within-group agreement,

to ensure that interrater agreement of team members on any variable of the survey is high. IRRs were calculated for each of the 20 teams and for all variables relative to positive classes of emotions (achievement and approach). Table 1 presents IRRs along the same organization as the ICCs. Median IRRs were ranging respectively for achievement emotions from .95 to .98, and for approach emotions from .96 to .98. For resignation and antagonistic emotions, IRRs were calculated only for the teams where the number of respondents was equal or superior to half the total size of the team: for example a team with a total of 6 members had to have 3 members at least or more reporting a resignation or an antagonistic emotion to be taken in consideration.

ICCs and IRRs for decision-making variables are reported in Table 2. ICCs are all positive and statistically significant (with p levels ranging from .10 to .001, and .25 in the case of alternative generation in the Developing Phase). IRRs ranged from .82 to .89, thus indicating a high level of agreement within the teams.

Table 2. Intraclass coefficients and interrater reliability coefficients for decision-making

	ICC	Median IRR
Alternative generation Starting Phase	.22**	.87
Alternation evaluation Starting Phase	.20**	.84
Alternative generation Developing Phase	.09**	.86
Alternative evaluation Developing Phase	.30***	.86

Note. $n = 20$ teams.

** $p < .25$ (liberal criterion for significance, recommended by Kenny and La Voie (1985); * $p < .10$; ** $p < .01$; *** $p < .001$.

Results

Correlations among the variables for Mean scores of Time 2² are presented in Table 3. Alternative evaluation and alternative generation correlate strongly, showing the convergent validity of these measures. Results support partially Hypothesis 1, that is approach emotions were positively related to alternative generation, but achievement emotions were not, during the developing decision period. The result profile was similar but not significant during the starting period. Results did not support Hypothesis 2 because negative resignation emotions were unrelated to alternative generation. The result profile was similar during the starting period. In respect to Hypothesis 3, the negative role of achievement emotions on alternative evaluation was not supported and the positive role of approach emotions was not significant, but positive. Associations were not significant during the starting period. Results

² When not otherwise specified, the term “affect” is used as a general term including various affective constructs: emotion, mood, affect disposition, or affective attitude.

¹ The direction of the predictions is given in the hypotheses.

Table 3. Means, standard deviations, and intercorrelations across time periods at the aggregated team level

	Mean Overall							
	Mean	Sd	1	2	3	4	5	6
1. Achievement	.54	.19						
2. Approach	.67	.23	-.05					
3. Resignation	.05	.03	-.49*	.28				
4. Antagonistic	.04	.02	.24	.04	-.15			
5. Alt. generation T2	4.88	.64	-.22	.44*	-.03	-.13		
6. Alt. evaluation T2	5.44	.92	.01	.29	.24	-.37*	.75**	

Note. Bold $r = p < .10$ (1-tailed); bold $r^* = p < .05$ (1-tailed); bold $r^{**} = p < .01$ $n = 20$.

partially support Hypothesis 4 as antagonistic emotions were negatively related to alternative evaluation. The result profile was similar but not significant during the starting period.

Finally an overall index of decision process quality was correlated using Rho, a non parametric test, on a positivity ratio to contrast Hypothesis 5. The mean ratio was strongly positive (Achievement+ Approach/[Resignation + Antagonistic]*2) or $1.21/.18 = 6.7$ and similar to high performance teams (Losada, 1999, quoted in Fredrickson, 2009). The ratio using both positive emotions was not significant but in the direction of Hypothesis 5, the positive approach emotions over negative emotions ratio showed a marginal significant correlation Rho (20) = .30, $p < .10$ with decision making variables. These results suggest that a positive ratio is associated to a better team functioning, also confirming the presence of a positive emotional climate, the positive impact of training, and the intrinsic motivation of participants.

Discussion

Results showed that individual emotions could be aggregated to an index of shared emotions or emotional climate. Moreover, even with low degrees of freedom, these collective emotions showed significant associations with aggregated team level decision making indexes, confirming that emotional climate have a predictive value of collective behavior (De Rivera, 1992; De Rivera & Paez, 2007).

Results also showed the importance of differentiating positive and negative emotions. Approach positive emotions were associated with and a predictor of improved decision-making processes, but achievement positive emotions were not. Antagonistic negative emotions were associated with and a predictor of poorer decision-making processes, but negative resignation emotions were not.

Approach positive emotions predict alternative generation, mainly during the developing phase. This is congruent with studies showing the broad and building effects of positive emotions (Fredrickson, 2009). However, positive achievement emotions show a more

limited influence, confirming that is important to differentiate at least class of positive emotions. This could be explained by the appraisal tendency related to this type of emotions. Because achievement emotions are related to high control and certainty probably they restrict the generation of alternative responses and reinforce mainstream and dominant way of behaving (Keltner & Lerner, 2010).

Resignation emotions were unrelated to alternative generation and evaluation, contrary to previous research on sad moods at the individual level – but associations were slightly negatives showing the same trend (e.g. Higgins, Qualls, & Couger, 1992). Antagonistic emotions were negatively related to alternative evaluation. These findings are congruent with previous research in group decision-making. Janis (1989) postulated that anger prevents team members from evaluating alternatives. In the strategic decision-making literature, the dichotomy between cognitive conflict and affective conflict (e.g. Amason, 1996) relies on the fact that anger leads to interpersonal conflict (or affective conflict), which in turn is detrimental to decision-making. Amason (1996) argued that anger inhibits the process of considering all contradictory viewpoints and of making decisions. Finally, studies show that anger decreases quality of judgments, increasing the reliance on heuristic cues, because of the underlying appraisal of certainty associated to antagonistic emotions (Keltner & Lerner, 2010).

This exploratory study of strategic decision-making in teams focused on the role of specific emotions, grouped in classes of emotions, which share common properties that seem relevant for the study of “emotional climates” in teams. Barsade and Gibson (1998), when addressing the issue of collective emotion, have suggested that studying group emotion based on specific emotions (e.g. anger, versus joy) could improve our knowledge on group emotions and their effects on behaviors. In the same vein, Sanchez-Burks and Huy (2009) have demonstrated that the ability to recognize the diverse emotional composition of groups (e.g., teams, business units) is an important leadership competence. In our study, the importance of differentiated types of positive emotions was supported by the fact that only the ratio of

positive approach emotions over negative emotions, but not the global positive over negative emotions ratio, was related to decision-making and cohesion. The present research has contributed in a modest manner to advances of knowledge in this direction.

Limitations

The first limitation is that both emotions and decision-making variables were self-report measures, and the inherent limitation of self-report is acknowledged. Data collection through self-reports should be complemented in future studies by video recordings, observations or interviews. Weingart (1997) recommends that observation of group processes is a more informative data collection method. Larsen and Fredrickson (1999) have pointed out that the advantage of external observers is that they are unobtrusive in naturalistic environments. It is reasonable to counter argue that, in the environment described in this paper, external observers would actually be considered somewhat intrusive. Several observers would be required, as it would be very difficult for one single person to track both emotions and their visible behavioral consequences, and decision-making processes, as they unfold in a non-systematic way. Thus, the presence of several observers in a relatively small study room would not be adequate.

The second limitation is that participants were constrained to report two emotions. Theoretically, it can be argued that at any given point in time, it is not possible to feel many more than two emotions given the investment made by the organism to produce an emotion (see Izard, 1991). However, Scherer and Ceschi (1997) suggest that emotion blends may be the kinds of emotional response subjects have in naturalistic situations. Scherer and Ceschi acknowledge that timing could be a critical issue and that more sophisticated ways of measuring emotions at very precise moments in time will have to be devised. A combination of laboratory experiments where it is possible to use technological instruments to detect micro-mechanisms and of field studies will have to be conducted to further explore this issue. In the latter case, the Emotion Wheel could be used as an instrument to measure blends by allowing participants to report as many emotions as they wish by class of emotions.

The third limitation of this study is that it cannot be ascertained that participants reported emotions, as defined in this paper. This is the challenge of using self-report measures to measure emotion or any other affective construct, as mentioned earlier. Whether researchers measure affect, mood, or emotion, many terms are similar: terms such 'happy', 'sad', 'elated', 'fearful', 'angry' are used to measure all three constructs. Future investigation should tackle the issues: of 1) more rigorous definitions of affect, mood, and emotion; and 2) more rigorous measurements.

Practical implications

One main practical application for the use of the Emotion Wheel as a data-gathering tool in the present study can be envisaged. The method of using the Emotion Wheel should address Kelly and Barsade's (2001) concern that "even if researchers are allowed to study the emotions, measuring them is difficult, given their generally brief nature." (p. 103-104). Then, the Emotion Wheel could be conceived as medium to help develop team processes, as it could be used in real project teams or in any meeting taking place in any type of organization. Over the course of this study, it could be observed that participants often used the Emotion Wheel as a medium to discuss their emotions freely with their colleagues and it became part of the norms of the teams to do so. Thus, discussing emotions yields self-awareness and awareness at the group level when, for example, participants discuss their group consensus emotion. In addition, by mapping emotions on the Emotion Wheel on a regular basis, everyone can see the evolution of the emotional climate and team members can proactively manage it (see Figure 1 as an illustration of a team's emotional map).

Conclusion

Three main aspects further characterize this study. First, the feasibility to measure emotions in teams repeatedly in a quasi-naturalistic environment has been shown, thus providing ecological validity to a research question often studied in laboratory settings. Second, this study has contributed to advance knowledge about the role of specific emotions at the collective level, as suggested by Barsade and Gibson (1998). Third, even though relationships congruent with previous literature was found, as for example, that positive approach emotions are positively related and to a lower extent than antagonistic emotions are negatively associated with decision-making processes, new light was shed on this area of research; for example, that resignation emotions are not necessarily impeding the generation of new alternatives. These findings lead the path to promising future research.

The challenge remains in the future to study the influence of emotions on actual decision outcomes as it is probably one of the most frequently asked questions when it comes to real-life implications of this study.

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