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Modeling student cohesiveness by waving the sociometric test with the picture apperception value test

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Abstract

One of the main problems why students and also other categories of stakeholders within various organizations are not productive and satisfied with their jobs and organizations is because there is a lack of group cohesiveness. Since the latter influence directly the performance and job satisfaction, then there are strong reasons to find effective and efficient ways to stimulate social and task cohesion. The aim of this study is to model student cohesiveness by using simultaneously the Sociometric Test (ST) for group formation and Picture Apperception Value Test (PAVT) for consonance or social cohesion. The study is based on the method of literature review, theory development, and simulation modeling of students' behavior. Findings of the study shows the way how can be integrated a sociometric test with a psychometric test for a common purpose (i.e. student cohesiveness referring to their values system). During simulation modeling a relevant point to be emphasized is the role of images during PAVT that serve as a substitute mechanism of questions to be answered. They activate emotions through the brain visual cortex and in them are anchored values. Therefore, through the mention procedure it is possible to understand social cohesion of different small groups of students. Regarding originality, value, and practical applications, this framework is novel and is supposed to increase students' productivity/performance in terms of perception, learning, and task execution. Furthermore, it is supposed also to increase student satisfaction during project works.

Keywords: *Student Cohesiveness, Sociometric Test, Picture Apperception Value Test, Categorical Values, Images*

1. Introduction

In the general literature of social psychology and organizational behavior, and in the specific literature of group dynamics, there are many considerations about the topic of cohesiveness, and its influence on the dynamics of groups, especially on job performance and job satisfaction,

Festinger and colleagues (1950) proposed for first the theory of group cohesiveness, suggesting that group cohesiveness can be defined as attractiveness to individuals within the group and attractiveness to the group as a whole. Thus, "*attraction between individuals is a basic ingredient for most groups, but when these relations intensify and proliferate throughout a group they can transform a conjoined group into a cohesive one"* (Forsyth 2010, pp. 119). Considering the attraction as the main component in defining group cohesiveness (Festinger 1950, pp. 274; Lott and Lott, 1965, pp. 259; Nixon, 1979, pp. 76; Hogg and Vaughan 2011, pp. 290), a "vortex" of the actual studies turns out to be the way group cohesiveness (in terms of attraction) is defined and measured. Citing Forsyth (2010, pp. 118), "*cohesiveness takes so many different forms and fulfills so many functions that some theorists have complained that the concept, ironically, lacks cohesion*". Thus, some authors use as indicator of group cohesiveness the sociometric test, remaining in a descriptive relational diagram (i.e. the sociogram + metrics), and defining only the "what"

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dimension (Moreno, 1953; Sherif and Sherif, 1956; Kitawaki, 1956). Others use qualitative analysis based on participant observation, monitoring group behavior between trust (communal concern) and secrecy (individual self-interest) (Fine & Holyfield, 1996). Finally, are those who prefer multi-item scales – *Group Cohesiveness Scale-Revised* (Treadwell et al., 2001), *Group Environment Questionnaire* (Widmeyer, Brawley, and Carron, 1992), *Perceived Cohesiveness Scale* (Bollen and Hoyle, 1990), *Group Attitude Scale* (Evans and Jarvis, 1986), *Gross Cohesiveness Questionnaire* (Stokes, 1983) – «with the goal, as ambitious as naïve, to 'measure the human and the society'» (Corbetta 1999, pp. 277).

In the practical context, one of the main problems why students are not productive and satisfied with their tasks and team projects is because they miss the group cohesiveness. Since the latter influence directly the performance and job satisfaction, then there are strong reasons to find effective and efficient ways to stimulate social and task cohesion, where the first influences the second. The aim of this study is to model student cohesiveness by using simultaneously the Sociometric Test (ST) for group formation and the novel Picture Apperception Value Test (PAVT) for consonance or social cohesion. The study is based on the method of literature review, theory development, and simulation modeling of students' behavior. Findings of the study shows the way how can be integrated a sociometric test with a psychometric test for a common purpose (i.e. student cohesiveness referring to their values system). During simulation modeling a relevant point to be emphasized is the role of images during PAVT that serve as a substitute mechanism of questions to be answered. They activate emotions through the brain visual cortex and in them are anchored values. Therefore, through the mention procedure it is possible to understand social cohesion of different small groups of students. Regarding originality, value, and practical applications, this framework is novel and is supposed to increase students' productivity/performance in terms of perception, learning, and task execution. Furthermore, it is supposed also to increase student satisfaction during project works. Nevertheless, since it is a simulation, it has the limitation of hypothesis testing.

2. Literature review about group cohesiveness: From social to task cohesion

As a general phenomenon, cohesion can be encountered in chemistry (i.e. intermolecular attraction), in linguistics (i.e. the semantic coherence of communication), in computer science (i.e. the correct recognizing from the decoder to a signal sent from the source), in biology (i.e. the normal functioning of human body, or the correct communication between organs), in ecology (i.e. the harmony between organisms and their environment), in music (i.e. the melody produced by harmonic combination of instruments), etc. So, the general interpretation scheme, in spite of the context where cohesion occurs, is harmonic communication and compactness.

Within organizations, the *"organizational cohesion is achieved by the willing alignment of individuals' purposes, which recognize the synergistic advantage of their coordination"* (Espejo and Reyes 2011, pp. 75). When the question is addressed to social groups, then it is correct to talk about group cohesiveness. The theory of group cohesiveness was firstly developed by Festinger and colleagues (1950). They were deeply convinced that group cohesiveness was a resultant valence of a field of forces, mainly concentrated on the reciprocal attractiveness degree between individual and group members or/and the group as a whole. This relationship is based on a mutual satisfaction of expectations. Therefore, the greater the attractiveness, the higher the tendency of group membership continuity and adherence to group standards. After the first studies, many other

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scholars have contributed on this topic, giving also their perspective on the definition of this subject matter. For instance:

- Aronson, Wilson, and Akert (2010, pp. 258) define group cohesiveness as *"The qualities of a group that bind members together and promote liking between members"*;

- Hogh and Vaughan (2011, pp. 288) describe it in terms of solidarity, *esprit de corps*, team spirit, and morale. More precisely, for the authors, group cohesiveness is "*The property of a group that affectively binds people, as group members, to one another and to the group as a whole, giving the group a sense of solidarity and oneness […] – the way it 'hangs together' as a tightly knit, self-contained entity characterized by uniformity of conduct and mutual support between members"*;

- Myers (2010, pp. 213) defines group cohesiveness as *"A 'we feeling'; the extent to which members of a group are bound together, such as by attraction for one another"*;

- Schermerhorn and colleagues (2010, pp. 188) delineate team cohesiveness like *"the 'feel good' factor that causes people to value their membership on a team, positively identify with it, and strive to maintain positive relationships with other members […] Cohesiveness is the degree to which members are attracted to a group and motivated to remain part of it"*;

- Wagner and Hollenbeck (2010, pp. 188) agree with the fact that *"A group's cohesiveness reflects the degree to which a group sticks together. In a cohesive group, members feel attracted to one another and to the group as a whole"*.

- For Hellriegel and Slocum (2011, pp. 372) *"Cohesiveness is the strength of the members' desire to remain in a team and their commitment to it"*.

- Finally, Luthans (2011, pp. 283) defines cohesiveness as "togetherness", focusing the attention on the effects that group cohesiveness has on some dependent variables (e.g. performance, satisfaction, etc.)

The cohesiveness depends so much on the brain parts that individuals employ when committed to a group as a whole considering concurrently what they expect from the group. For this reason, if an individual expects from the group to serve his/her financial, developmental, professional interests, the cohesiveness is rational; when he or she looks at the group as a possibility to offer contributes, be valuable, and of real benefit to others, then the cohesiveness is emotional. The role of emotions in group cohesiveness is pertinent, and more prevalent than the rational aspects. Especially, showing positive emotions in group situations affects directly the cohesiveness (Zurcher, 1982). *"This is because positive emotions strengthen feelings of control. As such, positive emotion is a necessary precursor of group cohesiveness* […] *Thus, facilitated by processes of emotional contagion, positive group affect energized by emotionally aware leaders, can enhance organizational creativity performance by facilitating group cohesion and positive affect"* (Ashkanasy and Ashton-James 2007, pp. 66).

On the other hand, according to Härtel, Zerbe, and Ashkanasy (2005, pp. 29), "*Emotions can express meanings and understanding because strong judgments and values are anchored in emotions and struggling*". The precedent opinion is sustained also by Taylor (1995) and Kirkeby (2001), and dates back in Aristotle's idea (1998). This means that group cohesiveness can be ensured when different people have similar/complementary values, and in order to understand their values we can use their emotions.

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According to literature, group cohesiveness can be analyzed basically from two perspectives: the socialization perspective and the operationalization one.

Referring to the socialization perspective or the social cohesion, it can be said that every single individual is part of a society, a community, or/and a group. The life within these circles cannot be understood without the interaction between members and overall without the need of belongingness (Maslow, 1954). In every organization people need and want to socialize with each other. This process is called social cohesion. However, this is a selective process, because individuals are more attracted by others which have similar values, mentality and information background. If we calculate the ratio of in-group choices to out-group choices, the greater the ratio, the greater the cohesiveness of the group (Dion, 2000). It means that the *attraction* is the core component of group cohesiveness (Festinger 1950, pp. 274; Lott and Lott, 1965, pp. 259; Nixon, 1979, p. 76; Hogg and Vaughan 2011, pp. 290).

The question of attraction is complicated because there are different levels of attraction. If two individuals within a group enjoy high levels of interpersonal attraction, it doesn't mean that the group is cohesive. But when cohesion is based on the attraction at group level, individuals remain as group members even when particular members (to whom actual group members are interpersonally attracted) leave the group (Ehrhart and Naumann, 2004; Mobley et al., 1979). Extreme cases of interpersonal attraction may influence to leave even members highly attracted by the group. Therefore, becomes necessary to distinguish what Hogg (1993) calls *personal attraction* and *social attraction*. If the attraction is personal, it is based on idiosyncratic preferences and close relationships (e.g. friendship or lovely relationships). In case of social attraction the individual perceives himself and the other group members in terms of 'prototypicality' or group norms. Hence, the social attraction is depersonalized.

Because attractiveness is the main force of cohesion becomes important to consider what causes attraction. In this context the research of social psychologists (although some little discrepancies) turns out to be coherent and convergent. Thus, the principal factors of attractiveness are: proximity, physical attractiveness, similarity and complementarity of attitudes, cultural stereotypes, same language, familiarity, opinions and personality, self-disclosure, common interests and experience, etc. Synthesizing, the interpersonal attraction (i.e. the consonance or cohesion) both at personal or group level can be ensured when the relational group members exchange with each other similar or/and complementary values, attitudes and information units (Barile 2013).

An ulterior point to be clarified is that cohesiveness may increase due to some factors such as proximity or physical attractiveness, but this can be simply an effect of a "pathological" resonance (a quick exponential acceleration) without fundaments. In this case the group life cycle will be really short because the consonance or the compatibility degree in terms of values-schemes-information is really low between members. It is like the passionate/romantic love and companionate love. Both types of love are necessary in a couple, but if the first is an acceleration like a curve that increases with future declining rates, the second manifests a constant and deep affectionate attachment, activating several parts of the brain (Aron et al., 2005) due to the strong fundaments (especially categorical values and general schemes).

Referring to the operationalization perspective or the task cohesion, once the social cohesion or the consonance between group members is established, they are ready to enter in resonance for accomplishing a common goal. In other words, the first step of "let's *stay* together" becomes a

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prerogative of the successive step of "let's *play* together". Thus, people feeling empathy with each other have greater chances to operationalize even difficult tasks and to reach defined objectives. Task cohesion is more evidenced in task-oriented teams like sport teams (Pescosolido and Saavedra, 2012) and military squads (Siebold, 2007). A classic model of cohesion that includes both social and task cohesion is Carron's model, based on environmental factors, personal factors, leadership factors, and team factors (Carron, 1982). Restricting the focus on task cohesion, for Carron this is the degree to which members of a group work together to achieve common goals. To achieve high levels of performance group members must have and share similar or/and complementary information units (knowledge background) and synthesis interpretation schemes (knowledge tools). A group whose cohesiveness is generated by a shared knowledge background and tools has great probability to be high in collective efficacy, which stands for shared beliefs, perceived competence in group coordination, and perception of collective resources by the group members in accomplishing competently and effectively a group's task (Zaccaro et al., 1995).

Finally, group cohesiveness affects, and is positively related with some dependent variables of organizational behavior, such as performance (Carron and Brawley, 2012; Forsyth 2010, pp. 138; Chiocchio and Essiembre, 2009; Park and Shin, 2009; Beal et al., 2003; Gully et al., 1995; Mullen and Copper, 1994; Oliver, 1988) and satisfaction (Hellriegel and Slocum 2011, pp. 373; Manxhari 2010, pp. 297; Williams 2007, pp. 51-54; Van der Vegt, 2001; Hoyle and Crawford, 1994; Hackman, 1992; Hogg, 1992; Hare, 1976; Van Zelst, 1952). Studies show also that cohesiveness is related to performance, not because cohesiveness causes groups to perform better, but because groups that perform better become more cohesive (Forsyth, Zyzniewski, and Giammanco, 2002). In addition, in their meta-analyses, Mullen and Copper (1994) have shown that cohesiveness and performance are reciprocally influenced in a bidirectional relationship (cohesion influences performance with a weight .25, as performance influences cohesion with a weight .51), having as a moderating variable the "task interdependence".

3. Methodology: simulating student cohesiveness with ST and PAVT

3.1. First step: the Sociometric Test (ST)

Starting the analysis from the problem statement, one of the problems is the way of measuring group cohesiveness. Within the education context, it is convenient to start with the Sociometric Test (ST) for creating groups in accordance to friendship preferences. Also, the perfect settings of ST application, since its creation, have been classrooms (Corbetta, 1999). As a quantitative method, the *Sociometric Test* has been developed by the psychotherapist Jacob Moreno (1953). The sociometric test has been chosen in this work because it is considered by the authoritative literature an indicator of group cohesiveness (Sherif and Sherif, 1956; Forsyth 2010, pp. 126-127). The logic of different sociometric tests is always the same. Today, technology has improved the procedure by offering various soft-wares. In the market one of them is also the GroupDynamics software®. The software was created by the software developer Simone Capretti, with the fundamental support of Prof. Salvatore Mastrangelo, Dr. Lawrence Sherman, and the eminent scholar of group dynamics, Dr. Donelson Forsyth. Specifically, although there are no data available for reliability of the GroupDynamics software®, this instrument has been awarded by *brothersoft.com, filecluster.com, findmysoft.com, softepic.com, and softpedia.com.* The software is composed by seven sections: Questions, Subjects, Answers, Bar graph, Target graph, Sociogram, and Metrics.

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With the aim to collect data and to divide the classroom in small groups, it can be used two types of questions, positive and negative. For example, positive and negative questions that can be directed to the students might be the following:

Positive – *What are your three best classroom friends with whom you feel more harmony?*

Negative – *What are your three classroom friends you tend to avoid the most, or to be socialized as little as you can?*

The words "positive" and "negative" are used by the program in order to show acceptances and rejections.

The questions can be administered to the students as a questionnaire modality including the necessary orientations. After confidential students' answers, the professor can make use to the program for the elaboration of friendship preferences given by the participants. At the end, the program gives a bar graph, a target graph, a sociogram, and the metrics.

The *bar graph* contains the number of subjects and the number of acceptances and rejections for each subject. It means that every participant makes an evaluation of the environment (the class) from which extracts the context (his/her own group of friends).

Referring to the *target graph*, the program defines subjects in accordance to extroversion, socialization, and leadership. In specific, subjects are categorized as 'popular', 'rejected', 'neglected', 'controversial', and 'average'. Here is important to know the relevant influencers and to understand how they can influence positively the rest of the group.

The program offers also the possibility to configure the participants' preferences through the *sociogram*. The sociogram is a graphic representation of social relationships that serves to create small groups within the classroom. The social links between subjects are represented by arrows. There are three levels of choices for every subject: first choice, second choice, and third choice or more. In the process of group formation through the sociogram, the observer/professor can be helped by techniques such as natural observation, participant observation, and personality tests (e.g. MBTI®). The sociogram is very important in this context also for the Picture Apperception Value Test (PAVT), because within the groups created with the sociogram it can be tested the students' cohesiveness.

At the end, the program provides also the *metrics*. They show acceptances/rejections received/given based on value and density. Considering the above parameters, it can be said that the program ranked participants in accordance to their leadership traits and popularity.

3.2. Second step: The Picture Apperception Value Test (PAVT)

One thing to be underlined is that the sociometric test is a descriptive measure ("what happens") and doesn't tell us why people are interpersonally attracted. It "designs" groups telling who the members of one group are, and who the members of another one are. Despite its limits, it has been evaluated as an indicator of group cohesiveness. But we need to know also the reasons behind why people stay or don't stay together. In this way we can use the feedback as a controlling mechanism of students' behavior in order to increase positively the overall class performance and satisfaction. The scope of this step is to evaluate the consonance (based on macro-categorical values) within the small groups, which were created before by the sociometric test. Through the

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following simulation procedure is possible to assess the classified groups in accordance to their system of values, and to define also the degree of cohesiveness within each group.

Before entering into details, we remind that PAVT combines the logical structure of 'Thematic Apperception Test', known also as the picture interpretation technique (Murray, 1943), with the logical structure of 'Value Surveys' (Ericson, 1969; Rokeach, 1973; Schwartz, 1999, 2006; Hofstede, Hofstede, & Minkov, 2010; Barile, 2011). More precisely, the general technique of picture apperception was combined with Barile's survey on categorical values (Barile, 2011).

Now, let's explain the logical structure of the test. First of all, in an *ad hoc* session it is advisable to explain to the participants the meaning of categorical values and macro-categorical values derived from them. Barile's survey (2011) showed that from a list of human categorical values, using the statistical techniques of *principal component analysis* and *factor analysis*, was possible to identify common factors which were named *macro-categorical values* (i.e. universal human values). These macro-categorical values can be expressed as a continuum between extreme states (pairs), as follows:

1. Ethical conduct (*from being abusive, to being respectful and responsible*);
2. Desire for success (*from being indolent and passive, to being supernatural and delirious*);
3. Sense of duty (*from indifference, to "self-sacrifice"*);
4. Focus on social relationships (*from egoism and individualism, to extreme altruism*);
5. Seeking consensus (*from personal image and credibility, to usefulness for the community*);
6. Opportunistic behavior (*from abusing with power/authority for personal gains, to dedicating yourself to the accomplishments of organizational goals*).

Then, it must be made clear to the participants that different persons have different hierarchies of macro-categorical values, and the same person might vary the hierarchy when the interactional context changes.

It is fundamental to explain to the students that each of the above values assumes a typical trend like a "Gaussian distribution", or a trend that goes from one extreme to another appointing conceptually opposing pairs of objects, subjects, concepts, events, etc (e.g. bad-good, black-white, small-big, etc). Therefore, in order to express each of the macro-categorical values as a "normal distribution", it can be used Osgood's *semantic differential*, a scaling technique with a range {1 – 7} (Osgood, 1952; Osgood, Suci, & Tannenbaum, 1957). The choice of semantic differential is not casual. This instrument was created by Charles Osgood and colleagues in order to measure the meaning of concepts. So, it is based on the subjective perception that individuals make inside the surrounding environment of objects, events, figures, other individuals, and so on. Hence, the semantic differential becomes a connection bridge between value surveys and picture perception/interpretation techniques, arriving to a unified point named as Picture Apperception Value Test (PAVT). However, it is necessary to underline that the scientific basis of PAVT go beyond the semantic differential. Reminding, a picture serves as a stimulus for the brain's visual cortex activating emotions. As said earlier in this work, emotions are strongly connected with values. Thus, with PAVT we can catch-out individual human values by stimulating their emotions simply through a procedure of picture projection: i.e. picture → emotions → values.

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Once explained to the participants the concepts of categorical values, macro-categorical values, and semantic differential, the procedure might continue (in another *ad hoc* session) with the execution of the *picture apperception value test*.

To the participants should be administer two documents: one containing only the macro-categorical values, each one of them specified by the defined pairs of semantic differential; the other containing the number of pictures projected on the screen, the list of macro-categorical values per picture, and the scale {1 – 7} for each picture and for each macro-categorical value. In other words, the first document is consultative, and the second is the document of data collection in which participants have to give the answers. The question is: what kind of answers?

At this stage, a projection of pictures on a large screen within the classroom can be made. Pictures can be presented randomly in accordance to some categories such as objects, celebrities, events (historical and actual), etc. Some pictures must represent the actual students' life which is strongly related with the culture. Each one of the pictures serves as a stimulus for the brain visual cortex to give an answer. Thus, *pictures* play the same role that *questions* play in a questionnaire, with the sole difference that they activates better the emotions. In other words, considering context and purpose, pictures and questions can be described as functionally synonyms. In practice, for each picture the participants might follow these guidelines:

a. *Ask yourself: how many macro-categorical values (one, more than one, or nothing) this picture transmits to me*?

b. *Then look directly to the document one with the aim to have a brief look at all the listed values and their extremes (pairs); look them quickly one by one.*

c. *After choosing the stimulated macro-categorical values, look at the scale {1 – 7} in document 2, and then circle a number within the scale next to each value chosen*.

The logic of this test is to stimulate with pictures the brain visual cortex of students. Because in that part of brain are stored emotions, and since values are anchored in emotions (Härtel, Zerbe, and Ashkanasy 2005, pp. 29), then, through this test we can understand the values of each participating student. After that, by making a simple standard deviation (SD) analysis, or/and coefficient of variation (CV), we can evaluate the level of students' cohesiveness in terms of values within each group created previously with the sociometric test. This helps professors to understand within their classrooms the social cohesion which becomes a must for task and operational cohesion.

4. Conclusions and implications

This study shows the way how can be integrated a sociometric test with a psychometric test for a common purpose (i.e. student cohesiveness referring to their values system). During simulation modeling a relevant point to be emphasized is the role of images during PAVT that serve as a substitute mechanism of questions to be answered. They activate emotions through the brain visual cortex and in them are anchored values. Therefore, through the mentioned procedure it is possible to understand social cohesion of different small groups of students. This helps professors to understand within their classrooms the social cohesion which becomes a must for task and operational cohesion. In summary, the basic scheme of PAVT is: picture → emotions → individual values → analysis of standard deviation in terms of values among group members → group

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values similarity/complementarity → social cohesion degree → task cohesion → performance and job satisfaction.

On the other side, the sociometric test satisfies a double perspective: one singular and one other plural. The singular or individual perspective is based on metrics. So, personal choices given and received manifest the individual's sociometric status. The plural or group perspective represents the group's sociometric status or its relational structure (Corbetta 1999, 278-281). The relational structure of the group is designed by the sociogram through which it is possible to design small groups of students in accordance to their friendship preferences.

Regarding originality, value, and practical applications, this framework is novel and is supposed to increase students' productivity/performance in terms of perception, learning, and task execution. Furthermore, it is supposed also to increase student satisfaction during project works. The theoretical and the pragmatic perspective of this study can inspire the instructors to consider the compatibility between students and their cohesiveness in a new way: the intertwined way of the sociometric test with the picture apperception value test. The study opens new horizons for team leaders that want a harmonic social cohesion based on categorical values.

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