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Comparative aspects concerning the effects of extraversion on performance in a cognitive task in competitive and cooperative conditions

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Abstract

This study aims how extraverts differ by introverts in cognitive performances when they work in different conditions of in-group interactions, namely in-group cooperative or in-group competitive context. The participants were systematically trained to work by in-group cooperation or competition. The control group was individual activity. Results indicated that in competitive group condition extraverts had higher performance and in cooperative group condition introverts performed better. Possible explanations emphasized the stimulating effect induced by in-group competition on extraverts and by the fact that introverts have better results in cognitive task in non-tensity environment such as in group cooperative activity. Size effects were small.

Keywords: competition, cooperation, in-group activity, extraversion, performance, cognitive task.

1. Introduction

Numerous psychological researches focused on the relationship between personality and performance, problem still quite controversial, but with implications both theoretical and practical. Empirical studies have shown that the relationship between personality traits and performance is moderated by two categories of variables: contextual and related to the nature of the task. In the first case is a sensitivity to context of the traits' effects on the performance, and in the second case on the fact that only certain tasks are sensitive to traits, and a certain trait might have or not beneficial effects on performance depending on the task. Extraversion is one of the most studied traits in relation to performance. Eysenck (1969, 1981)

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explained differences of performance between extroverts and introverts by sensitivity to context. Extroverts characterized by lower levels of cortical arousal, tend to overtake introverts in stimulating conditions, while introverts have lower performances when the environment is exciting. Conversely, extroverted people are disadvantaged in non-stimulating environments where introverts works better (Eysenck & Eysenck, 1985). Concerning nature of the task as moderating variable, extroverts would experience low performance in simple task, carried out under unexciting conditions and superior performance in certain types of tasks, relatively difficult, especially when the environment is stimulating. Introverts perform better in certain types of problem solving (Eysenck, 1982). There are studies that do not support the Eysenck's arousal theory according to which extroverted persons tend to have better performance than introverts in stimulating conditions (Matthews, 2005).

The researchers were also interested in the situation where individual is part of a group and is influenced by the group interactions, and in the impact of in-group interactions on its performance. Studies have shown the superiority of cognitive performance achieved through cooperation to those obtained by in group competition or by individual activity (Johnson & Johnson, 1989). In a study which compared the impacts of cooperative and competitive efforts indicated cooperative team' members outperformed individuals competing with each other on four categories of problem solving (Qin, Johnson, & Johnson, 1995). But are authors that considered competition more stimulating than cooperation for obtaining a higher level of performance (Michaels, 1977) and superior to individual activity, although the evidence is still insufficient. The results of cooperation in different areas and tasks are at least as good as the results in individual or competitive conditions (Van der Linden & Haenen, 1999). Studies concerning the relationship between orientations of competition and cooperation and personality traits have shown that extraversion is positively related to both cooperation and personal development competition but unrelated to hypercompetition (Rossa, Rauscha, & Canada, 2003). Extraverts enjoy working in competitive situations and extraversion is a predictor for performance in work setting emphasizes competition (Hogan, Rybicki, Motowildo, & Borman, 1998). Task performance is positively related to extraversion, cooperative orientation, and competitive orientation (Chen, Xie, & Chang, 2011).

2. Purpose of Study

We propose to verify the influence that could has the extroversion on the performance in a cognitive task of problem solving, when the performance is obtained in a group activity with different forms of organization. Therefore, this study aims how extraverts differ by introverts in cognitive performances when they work in different conditions of in-group interactions, namely in in-group cooperative or in-group competitive context. In this respect, we anticipate the possibility that extraverted people obtain better performance when they working by in-group competition, while introverted people get better results when working by in-group cooperation.

3. Method

The experiment was conducted on 247 participants, first year students, with ages from 19 to 38 years (mean=20.95, s.d.=3.65, median=20). Participants were randomly assigned into two experimental conditions: cooperation (N1=102) and competition (N2=100). In the pre-experimental stage, participants were systematically trained over 12 weeks to work in small groups through cooperation or competition. The purpose of this stage of training was the developing a minimum level of cooperative or competitive in-group working skills to participants. In the experimental phase, participants in both conditions were distributed randomly in small groups of three which working in a cognitive task by in-group cooperation,

namely in-group competition. The control condition was individual activity (N3=45). Competitive or cooperative structure of the group activity was induced by prior instruction and the reward and penalty system used in activity' asses. In the cooperative condition were told that each member of the group must contribute to a better result for the own group and finally, every member will be assessed by the whole group assigned note. It made such a positive interdependence of resources, goals and rewards of group members that underlies their efforts to cooperate. Similarly, participants from competitive condition had solved the task but by competing with other members of the group. Were told them that the higher asses can be achieved by a single participant, and all other members are classified downwards. Was created a negative interdependence of resources, goals and rewards, as principle who underlying the competition. In both conditions, were indicated that the groups do not compete with each other. For those in the control group who worked separately state only that each participant will be evaluate according to own performance. The task was the same for all subjects and was problem solving type which requesting reasoning. Subjects noted the responses in their individual file. For each item correctly resolved the participants received one point. It did not limit the time for work. In the post-experimental stage, were applied Eysenck Personality Inventory and Raven's Standard Progressive Matrices Test. Subjects were classified based on standard into three categories: introverts, ambiverts and extraverts.

4. Results

It used 3x3 factorial ANCOVA. Dependent variable is performance defined as student's score on the cognitive task. The covariate is general cognitive abilities (IQ). Independent variables are extraversion-introversion (E-I) and the in-group activity condition with three levels (cooperation, competition, individual work). The conditions for ANCOVA are: a) Levene test $F(8,238)=1.128$, $p=0.345$; b) $r(247)=0.863$, $p<0.001$; c) homogeneity of regression: $F(8,229)=1.01$, $p>0.05$. The descriptive values for each experimental cells are: cooperative condition (introversion: N=33, mean=21.03, s.d=4.64; ambiversion: N=55, mean=20.09, s.d.=4.55; extraversion: N=14, mean=16.64, s.d.=4.89); competitive condition (introversion: N=31, mean=13.13, s.d=4.12; ambiversion: N=54, mean =14.85, s.d.=4.68; extraversion: N=15, mean=18.13, s.d.=4.59); individual condition (introversion: N=12, mean=11.92, s.d=3.55; ambiversion: N=27, mean=11.37, s.d.=4.43; extraversion: N=6, mean=17.83, s.d.=3.31).

The overall F test value is significant: $(F(9,237)=90.95$, $p<0.001$ (partial eta squared=0.775). One main effect is significant $(F(2,237)=4.72$, $p\leq 0.01)$ indicating a difference between the means of the performances in the three conditions (partial eta squared=0.04). No significant differences were found between performances of extroverts, introverts and ambiverts $(F(2,237)=1.92$, $p=0.14)$.

Bonferroni test indicated significant differences between the adjusted means of performances in cooperation condition versus individual activity, the average performance for cooperation are higher to those of the individual activity ($t=2.89$, $p=0.01$). No were significant differences between performances in cooperation than competition ($t=2.20$, $p=0.08$) and competition than individual activity ($t=2.07$, $p=0.61$). Also, the interaction effect is statistically significant $(F(4, 237)=2.89$, $p=0.02)$, which means that the work conditions' effect on performances is different for extroverted, introverted and ambiverted participants (partial eta squared= 0.05). The interaction of the two independent variables is represented in figure 1.

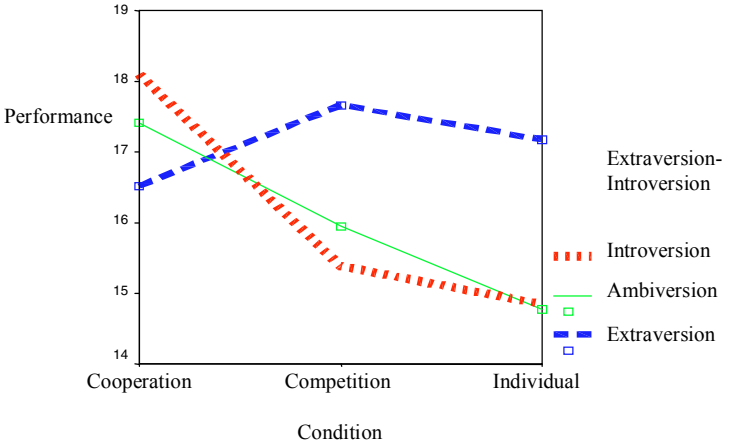

Figure 1. Graphical representation of the interaction of two variables

Orthogonal contrast test indicated a significant difference between the performances in the control group and experimental groups (t=-2.28, p=0.023), which are higher in the second case. Also were differences between performances in cooperative compared with competitive condition, data which are consistent with many research about the superiority of cooperation compared to other forms of activity (t=2.20, p=0.02). The effect size shows a very little difference between groups in both cases (r1=0.07, r2=0.07). Difference contrast tests revealed no significant differences between the performances of groups based on levels of extraversion (t1=1.92, p>0.05, t2=0.15, p>0.05).

Three from six simple effects are statistically significant: the interaction between "E-I" variable and cooperative condition (F(2, 237)=90.73, p<0.01), E-I and competitive condition (F(2, 237)=89.85, p<0.01), E-I and individual condition (F(2, 237)=39.20, p<0.01). So, if intelligence is maintained constant, is a significant interaction between work condition and E-I, regardless of its level, on the performance. The results show that: a) in cooperative work condition are differences between the performances of extroverts, introverts and ambiverts; b) in competitive condition are differences between the performances of extroverts, introverts and ambiverts; c) in individual activity condition are differences between the performances of extroverts, introverts and ambiverts. The other three simple effects are statistically insignificant: the interactions condition-introversion (F(2, 237)=0.06, p>0.01), condition-ambiversion (F(2, 237)=0.001, p>0.01), condition-extraversion (F(2, 237)=0.012, p>0.01).

Adjusted means of performance are: cooperation (introversion-18.10, ambiversion-17.41, extraversion-16.52), competition (introversion-15.38, ambiversion-15.94, extraversion-17.66), individual (introversion -14.84, ambiversion-14.77, extraversion-17.17). Inside each condition, if the intelligence would be constant, the performances would decrease slightly in cooperative condition, regardless of the level of extraversion. In competitive condition the average performance would increase slightly for introverts and ambiverts and would decrease little for extroverts. Also, in individual activity, performance would increase slightly to introverts and ambiverts and remain approximately the same to extroverts.

5. Discusion

Summarizing the results, it can say that the interaction of extraversion and group activity condition causes differences in performance in cognitive task if the influence of intelligence is controlled. In the

cooperative work condition introverts get slightly better performance than ambiverts and extroverts. The result could be explained by the fact that introverts perform better in relaxing and non-tensity environments. The cooperation activity supposes jointly efforts to achieve the common goal and the possibility of establishing positive relationships, attitudes of support, mutual help and trust between members of group and all these are contributing to a positively social context for the group activity. In competitive condition extraverts obtain superior performance that could be explained by extroverts' preference for activities in stimulating contexts. Extroverted persons are high sociable, like people and groups, seek for sensation and interpersonal contacts (Costa, & McCrae, 1985). They are initiating actions and prefer activities which stimulate and increase their initiative and level of excitability. An in-group competitive condition is offering to extroverts the opportunity for such exciting context of work. Unlike cooperation, competition contributes to developing a context of stimulating activity and relationships that involves taking risks in terms of „gain or loss". The competitive relationships are more incentives for extroverts' activity and results. Therefore, the competition is preferred for extroverts and has been motivating them to obtain better results. The individual activity get better results for extraverts compared with ambiverts and introverts who are relatively similar. It could be explained by an activating an effect of competition in extraverts because of their need to initiate actions which increase their arousal, and thus creating the necessary stimulating context.

Small values of the size effects limit the practical importance of the significant effects which requires a re-evaluation of the hypothesis in terms of identify and other personality variables which can have effects on performances in the different conditions of group activity. In educational field, the results have been starting points for the future empirical research aimed at: 1. identifying more possible ways to organize effective group activities in school, by meeting in the same group the participants who are relatively similar of their traits, but not opposite; 2. a better matching of skills of the team-mates work, from which the whole group would benefit in their activity; 3. because unlike competition cooperation provides more favorable contexts for high performance to all participants and differences between introverts, ambiverts and extroverts are not so higher, it can be conclude that cooperation could be a way of obtaining higher academic performances in the instructive-educational process.

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