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SHORT RESEARCH NOTE

Reducing Threat in Cooperative Learning: The Role of Decentering

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Previous research in cooperative learning has demonstrated that working on identical information may elicit comptence threat: Partners try to affirm their competence by focusing on their own position, which results in reduced learning. The present study tested a decentering procedure (emphasizing the complementarity of multiple viewpoints) as a way to reduce this threat when working on identical information.

Forty-four students discussed one text either with or without decentering. Results indicated that students working with decentering reported a marginally more positive relationship with their partner, less competence threat, and they had better learning performance. Decentering canceled out the negative relationship between perceived partner's competence and student performance, emphasizing its usefulness in overcoming the negative effects of competence threat when working on identical information.

Keywords: Threat; Cooperative learning; Decentering; Partner's competence; Social comparison

Learning situations involve social influence with the teacher or classmates introducing new perspectives that may challenge students' prior knowledge. Previous research stresses the importance of competence threat in understanding the way students may integrate new knowledge (Mugny, Butera, Sanchez-Mazas & Pérez, 1995; Pérez & Mugny, 1993). This threat represents a psychological feeling that one's own competence is challenged: People may ruminate on their own intellectual value. This kind of competence threat is likely to reduce information integration and learning as cognitive resources are taken up with rumination. Competence threat can take place even in cooperative learning, especially when working on identical information favors social comparison (Buchs, Butera & Mugny, 2004; Buchs & Butera, 2009). In the present study, we test the potential of a decentering procedure, which emphasizes the complementary nature of different points of view, to reduce this threat and favor learning when two students work on identical information.

Competence Threat and Learning

Social influence theories focus on the way individuals acquire knowledge, by modifying, completing or corroborating already existing knowledge (Mugny, Butera, Quiamzade, Dragulescu & Tomei, 2003; Quiamzade & Mugny, 2001). Conflict Elaboration Theory is particularly important for understanding learning situations because it focuses on aptitude tasks whose characteristics are relevant for academic tasks. Results in this framework underline the central role of competence threat in the understanding of how people process information when they are confronted with divergent points of view (Quiamzade, Mugny & Butera, 2013, 2014). People experience self-evaluation threat in situations of upward comparison, that is, when they compare themselves with a more competent partner (Muller & Butera, 2007). In the same vein, when two competent people disagree, they are likely to perceive diverging judgments as mutually exclusive, and this perception conveys the idea that one is right and the other is wrong. In order to protect their competence from this threatening representation, they orient themselves toward competitive behaviors with closed-minded reactions and narrowed reasoning; that is, they restrict their thoughts to what is explicitly represented in their mental models (Butera & Buchs, 2005). In sum, when the situation makes the relative competence of people salient, it may elicit a competence threat that reduces information processing.

Competence Threat in Cooperative Learning

In cooperative learning, the teacher proposes that students work together by stressing positive goal interdependence in which students' goals are positively related (Johnson & Johnson, 2009). The teacher structures the learning activity so that it creates a positive context in which students can work together in order to learn

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(Topping, Buchs, Duran & Van Keer, 2017): The more one student contributes, the more it helps the other students to learn. Thus partners' competence is supposed to be welcomed and helpful. Nevertheless, students in Western societies are neither socialized to cooperate nor used to doing so (Buchs, Gilles, Antonietti & Butera, 2016). Consequently, students sometimes fail to benefit from cooperative learning (Barron, 2003), particularly as working together may activate a threatening social comparison (Buchs & Butera, 2015).

In previous research, two cooperative situations were compared, in which students worked on texts (with the instruction to read and discuss the texts in order to understand): one situation with both positive goal and resource interdependence (students working on complementary information) and one with positive goal interdependence but with no resource interdependence (students working on identical information). Results have indicated that subtle cues allowing students to compare themselves activate evaluation pressure (Lambiotte et al., 1987) and competition (Buchs, Pulfrey, Gabarrot & Butera, 2010), even when accompanied by cooperative instructions. Indeed, working on identical information is especially likely to increase the opportunity for students to compare themselves and as a direct result question their relative competence. When students work on identical information they report engaging in more behaviors related to social comparison (Buchs, Butera & Mugny, 2004, Study 2) and more competitive conflicts (Buchs et al., 2010) compared to when they work on complementary information. Students have also been shown to experience competence threat with a consequent reduction of learning (Buchs et al., 2010; Buchs & Butera, 2015), as well as less-constructive interactions with others (Buchs & Butera, 2009; Buchs et al., 2004) during cooperative learning.

An important result underlines the role of competence threat: the situation (working on complementary versus identical information) moderates the relationship between a partner's competence and students' learning. Indeed, the positive relationship between a partner's competence and students' learning expected in cooperative learning is found only when students work on complementary information. This positive relation turns to a negative one when students work on identical information (Buchs et al., 2004, Study 2; Buchs & Butera, 2009).

By the way, working on complementary information does not represent an unconditional alternative for learning. Although resource interdependence stimulates cooperation, students working with resource interdependence are completely dependent on their partner for accessing information. This informational dependence may be problematic for learning in the case of poor quality of informational input (Buchs et al., 2004, study 2; Buchs et al., 2010).

The aim of the present study is to test the optimal cooperative learning situation by offering the possibility for students to work cooperatively on texts while avoiding informational interdependence and reducing potential competence threat. Working on identical information gives students access to all the information (no informational interdependence) but is likely to lead to competence threat. Thus the present study focuses only on working on identical information with the objective to test a procedure to mitigate competence threat.

Decentering as a Way to Reduce Competence Threat

Perspective-taking instructions and the capacity to adopt multiple perspectives may help to welcome and integrate different points of view (Butera & Buchs, 2005). Being instructed to take the other's perspective (understanding the other's reasoning, integrating the other's information) has been shown to enhance cooperation and reciprocal influence and lead to better problem solving (Falk & Johnson, 1977; Johnson, 1977). One way to urge people to consider other task partners' perspectives is to make them realize that taking several points of view into account gives them an objectively more accurate view of reality (Butera, Huguet, Mugny & Pérez, 1994; Huguet, Mugny & Perez, 1991–1992). In previous studies, this idea was tested by means of a decentering (also called decentring or decentration) task or procedure. A decentering task may either be carried out with a shadow-box task that focuses on the perception of geometrical volume (Butera et al., 1994; Gruber, 2000; Huguet et al., 1991–1992) or with different parts of a drawing (Quiamzade & Mugny, 2009; Quiamzade, Mugny & Darnon, 2009). For example, a shadow box has two openings that offer different perceptions of the same object inside the box (for a pyramid, one sees a triangle from one opening and a square from the other opening).

Both decentering procedures are effective in teaching participants that differences in knowledge are complementary, revoking the idea that divergence of opinion automatically implies that one view is wrong, and the other is right. To accomplish this objective, each participant is provided access to only one aspect of the information required to solve the problem at hand and, thus, the exchange of viewpoints with the other participant, is the only way to get a full picture of the situation. Thus decentering procedures are likely to enhance cooperative behavior in peer work. As Gruber (2000) proposed, "Presenting two perspectives bearing on a single object, naturally evoked cooperation as the appropriate response mode" (p. 353). Results also indicate that, in potentially threatening situations, decentering enhances the benefit of opinion confrontation on reasoning strategies (Butera & Buchs, 2005; Butera, Gardair, Maggi & Mugny, 1998, Study 2; Butera, Mugny & Tomei, 2000, Study 3) as well as the integration of divergent strategies or information (Quiamzade & Mugny, 2009; Quiamzade et al., 2009). In brief, when the situation involves a threatening social comparison, competitive regulation blocks the capacity of beneficial social influence (Butera, Mugny & Buchs, 2001). However, decentering makes it possible to change the meaning of

the task, strengthen the integration of new information, and thus, favor learning.

Decentering to Reduce Threat When Students Work on Identical Information

Building on this, the present study focuses on the role of decentering in the case of students working on identical information, because this situation is likely to stress competence threat even when accompanied by instructions to cooperate. We compared a situation in which students were asked to work together with and without a decentering procedure regarding the perception of geometrical volume (the shadow box paradigm, Huguet et al., 1991–1992). We predicted that with the decentering procedure, students working on identical information should 1) report less competence threat, 2) perceive a more positive relationship with their partner, and 3) learn more.

Method

Participants

Forty-eight psychology students at the University of Geneva participated in this study. Volunteer students from different courses were recruited (M_{age} = 23.74, SD_{age} = 4.44). During the debriefing four students indicated that they had already heard about decentering and were dropped from analyses, leaving a final sample of 31 females, 12 males and 1 non-response.

Procedure

Students arrived by appointment in groups of four or six at the laboratory. They expected to participate in a study on cooperative learning and to work on social psychology texts in dyads. At the beginning, participants were informed that they were going to read two texts (in reality only one text was presented) and work in cooperative dyads in order for both partners to master all information. The dyads were formed with the condition that students did not know each other prior to the experiment. Before they started working on the text, decentering was manipulated (see Independent Variables). No explicit association between the decentering and the work on the texts was made, but students went through the decentering procedure with the partner that they had anticipated working cooperatively with (and actually worked with).

After decentering, students were reminded of the cooperative instructions and all students started reading the "first" text silently (15 minutes) and discussed it (8 minutes) according to their role (see Control Variable) with the instructions to make sure they and their partner learned and mastered as much as possible all the information in the text. Finally, students completed a questionnaire about their perceptions during the interactions, followed by an individual learning test (see Dependent Variables). They also reported their perception of their partner's competence (see below). At that stage, students were informed that they wouldn't study the second text and the experimenter used the remaining time for debriefing.

Materials

The text was an adaptation of an extract taken from Cialdini's book (1987) *Influence and Manipulation.* This text introduces reciprocity as a psychological principle regarding influence and proposes some illustrations (analysis of daily situations as well as some experimental studies). The text was modified in order to reduce the reading time to approximately 15 minutes.

Control Variable

Roles. In line with previous research (see Lambiotte et al., 1987), two roles were introduced as a behavioral script to encourage cooperation: In each dyad, one of the students played the summarizer who had to explain as clearly as possible and in detail the information in the text. It was made clear to the students that their task was to facilitate their partner's learning. During the explanations, the other student played the listener's role and had to ask questions, request clarification and to share comments whenever necessary. The students expected to reverse roles for the second text (each student in the dyad would be responsible for one text and the listener for the other one). However, as only one text was presented, each participant ended up only playing either the summarizer or listener role (between-participants variable). This false belief was introduced because, according to Spurlin et al. (1984), the alternation of roles is likely to be beneficial to learning as it increases the commitment and the responsibility of both students in a learning dyad.

Independent Variable

Decentering. Decentering was introduced for 24 students (12 dyads) in one of the two experimental conditions, using a protocol originally created by Huguet, Mugny and Pérez (1991–1992). In this protocol, students are faced with a box with two openings: one side allows students to see a square, the other a triangle; the object in the box is in fact a pyramid lying on its side. Each member of the dyad has access to only one opening. Students write on a piece of paper what they see inside the box, and then they exchange information with their partner to determine what the box contains.

As in the original set-up, the majority of participants were unable to guess what was inside the box and so, after the exercise, the experimenter took the pyramid out, and explained the principle of why decentering is important, making it clear that the perception of forms depends on the perspective from which we perceive them and that a single perspective is likely to generate errors in judgment. Participants were also told that attention to the views expressed by other individuals was important because it is only by taking into account others' points of view that one can access a complete knowledge of the object. The remaining 20 students (10 dyads) in the control condition received no decentering and no information about the importance of perspective taking; they directly started working with the text.

Dependent Variables

Perception of interactions

Perceived quality of the relationship. Three questions (α = 0.89) were introduced (Buchs et al., 2004). Students indicated their perceptions of a) the degree of cooperation (1 = *very weak*, 7 = *very strong*), b) the quality of the relationship and c) the quality of the collaboration (1 = *very bad*, 7 = *very good*).

Competence Threat. Students answered three questions (α = 0.85, 1 = *not at all*, 7 = *very much*): To what extent did the discussion with their partner make you: a) feel that you were not very competent? b) doubt that you understood the text? c) fear saying something wrong?

Individual Learning Outcomes. Students answered seven scenario-based questions (comprehension questions). For each question, a scenario was proposed, and students had to choose from four alternatives what the theoretical principle predicts. For these multiple-choice tests, students were informed of the following notation: +1 for the correct answer, 0 for a non-answer and –0.25 for an incorrect answer. Students scored from –1.75 to 7.

Additional measure

Perceived competence of the summarizer was assessed by asking listeners to indicate what they thought of the ability of their partner a) to understand and b) to summarize information (1 = *very poor*, 7 = *very good,* $r = 0.65$, $p = 0.001$).

Results

As students learned in dyads, data may not be independent, and, therefore, we calculated Intraclass Correlation Coefficients (ICC) to check how much variance stemmed from the clustered level (dyads) in each one of our outcome variables. When clusters explain more than 5% of the total variability in the outcome variables, multilevel analyses should be conducted (Reis & Judd, 2014). Our results indicated that for the outcome variable "quality of relationships", a proportion of 21% was attributed to the work on dyads, *ICC* = 0.21, *SE* = 0.20, [0.025, 0.738]. However, for the rest of our outcome variables the ICC was equal to zero indicating that the variation of the outcome variable was only attributable to the individual level. The tested model comprised our two predictors, namely decentering (coded –0.5 no decentering and +0.5 for decentering) and roles (coded +0.5 for the summarizer and –0.5 for the listener). We report one-tailed tests for our directional hypotheses (students working on identical information should report less competence threat, perceive a more positive relationship with their partner, and learn more) and two-tailed for other tests. Due to space limitation, we do not report non-significant effects.

Perception of Interactions

Results[1] presented in **Table 1** indicated that, compared with the no-decentering condition, students in the decentering condition tended to report a marginally more positive relationship quality (M_{with} = 5.81 versus $M_{without}$ = 5.32), b = 0.49, $t(23.38)$ = 1.39, *one-tailed* p = 0.09, Cohen's f^2 = 0.04 and marginally less competence threat (M_{with} = 1.92 versus $M_{without}$ = 2.50), b = –0.58, $t(44)$ = –1.50, *one-tailed* p = 0.07, f^2 = 0.05.

Individual Learning Outcomes

In terms of individual learning test students performed better with decentering (M = 4.73, SD = 1.15) than without (M = 3.53, SD =1.59), b = 1.20, $t(44)$ = 3.04, *one-tailed* p = 0.002, f^2 = 0.22.

Supplementary Results: Decentering as a Moderator of the Relation Between Partners' Competence and Learning

In order to test whether decentering reduced threatening social comparison when students worked on identical information, we created a second set of analyses, entering decentering (–0.5; +0.5), perceived summarizer's competence (mean centered) and the interaction between the two variables as predictors of listeners' learning.[2]

Results revealed an overall negative relationship between the way listeners perceived their summarizer's competence and their own performance, b = –0.99, $t(22)$ = –3.95, *two-tailed* p = 0.001, f^2 = 0.78, but also

Table 1: Perception of interactions and learning outcomes for both roles depending on decentering.

	Without decentering		With decentering	
	Summarizers N = 10	**Listeners N = 10**	**Summarizers N = 12**	**Listeners N = 12**
Quality of relationship				
M	4.87	5.77	5.64	5.97
SD	1.54	0.98	0.97	0.80
Competence threat				
M	2.30	2.70	1.67	2.17
SD	1.42	1.49	0.98	1.47
Individual learning test				
M	3.63	3.43	5.06	4.40
SD	1.77	1.47	1.23	0.99

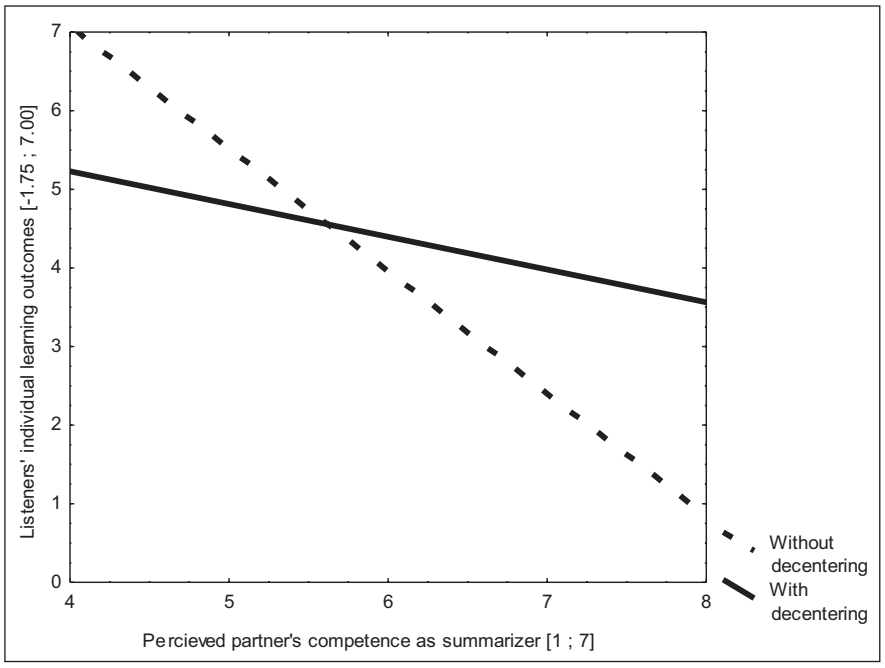

Figure 1: Relationship between the way listeners perceived their summarizers' competence and their own performance depending decentering.

pointed out that decentering moderated this relationship, $b = 1.14$, $t(22) = 2.28$, *two-tailed* $p = 0.03$, $f^2 = 0.26$. **Figure 1** illustrates that the negative relation between perceived partners' competence and listeners' learning appeared only without decentering $b = -1.56$, $t(22) = -4.12$, *one-tailed* $p = 0.001$ and not when decentering was introduced $b = -0.42$, $t(22) = -1.21$, *two-tailed* $p = 0.24$.

Discussion

Previous research has shown that, even when a dyad-based reading comprehension task is accompanied by instructions to cooperate (positive goal interdependence), the mere fact of reading the same text (no resource interdependence) encourages students to evaluate their partner's competence in the task and compare it to their perception of their own level of competence (Buchs & Butera, 2015). Thus, working on identical information activates a threatening social comparison that makes partner competence detrimental to individual learning (Buchs & Butera, 2009). We propose that decentering has the potential to reduce this competence threat by underlining the fact that differences in knowledge are not threatening but complementary.

Results of the present study indicate firstly that when students work cooperatively on identical information, decentering is likely to change participants' perception of the situation. As such, decentering favored cooperation, with students reported a marginally better quality of relationship and marginally less competence threat. Furthermore, decentering positively influenced student learning measured by an individual test taken after the cooperative work. Decentering also moderated the relationship between perceived a partner's competence and students' learning. Without decentering, the negative relationship between the competence that the listeners attributed to their summarizer and their own learning outcomes replicated previous results showing that working on identical information elicited threatening social comparison (Buchs & Butera, 2009). When decentering was introduced, the partner's perceived competence was no longer negatively related to students' learning. Decentering seems thus to desactivate the perception of negative interdependence between partners.

Although these results contributed to effective cooperative learning, we must temper them by noting a couple of limitations. The small sample constitutes the first limitation and certainly explains the lack of significance of some results (Świątkowski & Dompnier, 2017). A second limitation concerns the absence of a non-threatening cooperative situation. A further step would be testing that the positive effect of decentering occurs, especially in situations where a competence threat is present (see Quiamzade & Mugny, 2009). A future study could compare the effects of decentering when students work on identical information (competence threat) and when they work on complementary information (no competence threat) in order to test whether decentering is powerful only in the first situation.

Despite these limitations, two contributions can be underlined. Firstly, this study gives concrete indications regarding how to improve effective peer learning. The study aimed to test optimal cooperative learning situation by offering the possibility for students to work cooperatively on texts while avoiding informational interdependence and reducing potential competence threat. Our results propose that introducing decentering for students working on identical information is likely to favor cooperation without relying on resource interdependence. It could be a good solution for teachers who want to optimize their students' discussions on texts.

Second, the results enable us to generalize propositions about the Conflict Elaboration Theory. Indeed, results

from Conflict Elaboration Theory mainly deal with information processing when participants are confronted with a source's contradictory or conflicting information. They point to the negative effect of competence threat on integration or processing of this information. Our research extends this result by underlying the same process related to competence threat but in learning situations. Our main dependent variable concerned learning outcomes when two students are freely discussing texts. Our results confirm Quiamzade et al.'s (2013, 2014) finding that threat to the self determines how people process information in a situation that differs in numerous ways from the original situation allowing to extend the relevance of this theory.

Together, these results invite us to reflect on ways to reduce the threat to the self in order to favor learning. Decentering may be powerful and easy to implement in different situations.

Notes

[1] Regarding the controle variable Role, the only effect indicates that listeners (M = 5.87) reported a more positive relationship quality than summarizers (M = 5.25), b = –0.60, $t(23.01)$ = –2.22, *two-tailed* p = 0.04, f^2 = 0.16.

[2] Regarding partner's competence as dependent variable, results indicated that listeners evaluated their summarizer as highly competent (M = 6.16, SD = 0.76) and no difference appeared regarding decentering, M_{with} = 6.00, SD = 0.78 and $M_{without}$ = 6.35, SD = 0.74), b = –0.35, $t(22)$ = –1.13, *two-tailed* p = 0.27, f^2 = 0.03.

Competing Interests

The authors have no competing interests to declare.

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