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Why more Competent Adolescents Advance or Regress after Assymetrical Peer Interaction: Studying Dialogue Characteristics that Make a Difference*

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This study explores differences between more and less competent peers in joint problem-solving dialogues, related to opposite interaction outcomes of more competent students (progression/regression). Ten asymmetrical peer dyads were selected from 47 dyads participating in the previous study: five in which more competent (MC) student progressed the most, and five in which MC students regressed the most after a post-test. Ten dialogue characteristics were established in 50 conversations of these dyads. Cluster analysis revealed two dialogue types associated with different interaction outcomes of MC students. In the first one, MC students justified correct answers but behaved inconsistently with their higher competences. The second cluster characterizes domination-submissiveness pattern and MC students' unwillingness to justify opinion. All regressing MC students participated in the first dialogue type and 56% of progressing MC students in the second. Qualitative analysis of the conversations typical for extracted clusters implies that although ready to provide arguments to their peers when they can, regressing MC students exhibit uncertainty, thereby losing from interaction. Progressing MC students seem to protect themselves against possible interaction disturbances by dominant attitude and withdrawal from communication.

Keywords: peer interaction, dyads, peer dialogue

Highlights:

- Cluster analysis: 2 dialogue types related to different outcomes of MC students.
- All regressing MC students justified answers but were insecure in their competences.

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- 56% of progressing MC students did not justify opinion and show dominant attitude.
- Qualitative analysis brought deeper understanding of peer interaction dynamics.

The importance of peer interaction for development of logical reasoning was introduced by Piaget (1941/1999, 1950/1999, 1960/1999) who perceived it as equal and cooperative, hence stimulating, unlike a child-adult relationship characterized by adults' dominance. He never investigated peer interaction, but his followers started a fruitful line of empirical studies examining the role of socio-cognitive conflict between peers and its effects on cognitive development (see Stepanović Ilić, 2015; Stepanović Ilić et al., 2015). Inspired by the mentioned studies Vygotskian authors transferred their interest from adult-child to peer interaction emphasizing cognitive asymmetry between peers and the influence of a more competent peer within zone of proximal development (ZPD) of his/her interaction partner. These authors further specified mediating tools connected with ZPD concept (Stepanović Ilić et al., 2015) and highlighted the role of language as the most important mediation mean in Vygotsky's theory, especially in the process of knowledge construction during educational process (see Littleton & Howe, 2010, Mercer & Littleton, 2007; Mercer & Howe, 2012). Socio-cultural research of peer dialogue influenced Piagetian authors to study not just interaction consequences, but the interaction process also (Stepanović, 2010). The mutual interest in peer interaction in the context of cognitive development and education inside Piaget's and Vygotsky's theoretical frameworks resulted in the new discoveries regarding the complexity of peer interaction phenomenon and its significance for intellectual development (Littleton & Howe, 2010; Perret-Clermont, 2015; Psaltis, 2014; Stepanović, 2010).

Investigations within these two most influential approaches in developmental psychology were dominantly oriented towards less competent (LC) participants aiming to identify factors enhancing their reasoning. Following more competent (MC) participants within the interaction studies we identified findings about their advancement (Allen & Feldman, 1973; Denessen et al., 2008; Roscoe & Chi, 2007; Webb, 1982), regression (Fawcett & Garton, 2005; Tudge, 1989, 1992) and lack of interaction effects (Webb et al., 1998; Stepanović Ilić, 2015). Such heterogeneity could be related to different investigation settings, but it can also be a result of an overly complex interplay of factors (individual, interpersonal, task, investigation and broader socio-cultural context) involved in the interaction process.

In studies about tutoring, student-tutor's advancement is usually associated with reflective reasoning as a result of their inclination towards elaborated explanations and questions leading to a deeper understanding in tutees (Roscoe & Chi, 2007, 2008; Webb, 1982; Webb, 2001). Besides, it is shown that children-experts benefit from receiving specific training in scaffolding (Roscoe & Chi, 2007, 2008; Tartas et al., 2010, 2016). Tudge (1989, 1992) relates MC students' regression to a lack of confidence in their own abilities when exposed

to reasoning of LC peers. Roscoe and Chi (2008) noticed that many students do not profit from tutoring due to a lack of capacity to manage their own learning, elaborate opinions and provide new information for tutees.

Scholars highlight that social asymmetry between peers also affects interaction process (De Abreu, 2000; Grossen 1994; Leman & Duveen, 1999, Psaltis & Duveen, 2006; Schubauer-Leoni & Grossen, 1993). Thus, when aware of their "superior" status student-experts are more prone to making decisions individually than in cooperation with novices (Grossen et al., 1996; Tartas et al., 2010, 2016). Similarly, Verba and Winnykammen (1992) demonstrated that appropriate guidance of novices by peer-experts was more frequent in a situation of "reinforced asymmetry" (dyads including an expert with high academic achievement and a novice with low achievement), while cooperation was more often found in "counterbalanced asymmetry" situation (low achievement expert, high achievement novice).

Problem

We intend to further contribute to a relatively rare investigation topic, namely to the understanding of interaction circumstances affecting MC students. This is in line with the stance that research should not always concentrate on average pupils as schools often do (Dimou, 2009). Specifically, we aimed to relate different interaction outcomes of MC students (progression/regression) with the characteristics of their dialogue with LC peers during joint task solution.

The investigation is performed on the data collected within a wider study investigating the role of asymmetrical peer interaction on formal-operational thinking development (see Method). The results showed that LC students progressed, and that interaction did not affect MC students (Stepanović Ilić, 2015). However, it transpired that MC students were a very heterogeneous group regarding their performance on the post-test (Stepanović Ilić, 2015). Hence this study focuses on those who progressed or regressed the most, assuming that the explanation for different interaction outcomes could be related to the nature of peer dialogue. This assumption is supported by the research stemming from both theoretical frameworks. Relying on Vygotsky's consideration of language as a powerful tool mediating cognitive development, Mercer and associates have recognized peer conversation as an important research goal (Rojas-Drummond et al., 2003; Rojas-Drummond & Mercer, 2003; Mercer & Littleton, 2007; Littleton & Howe, 2010). Social Genevans, continuing Piagetian line of investigation, also acknowledged the need to "open the black box" and begin to study peer communication during joint problem solving (Psaltis, 2015; Psaltis & Duveen, 2006, 2007; Psaltis et al., 2015).

Consequently, our first step was to identify the most significant dialogue features which could positively or negatively affect MC students' post-test performance on the basis of empirical findings and relevant theoretical approaches (see Table 2). Regarding our expectation of their association with interaction outcomes of MC students, five characteristics are categorized as productive (exchange of arguments, shared socio-cognitive conflict, mediation,

justification of the right answer by MC student, A-ha moment) and the other five as *inhibiting* (lack of cooperation, non-shared socio-cognitive conflict, inconsistent behavior of MC students, dominant-submissive communication pattern, non-justified answer by MC student). In the next step we identified specific patterns of dialogue dimensions related to progression/regression of MC students. Subsequently, qualitative analysis was performed on the peer conversations best representing extracted dialogue patterns associated with opposite interaction outcomes of MC students. This is in accordance with Social Genevans, authors from Piaget's background who appreciate the role of social factors in cognitive development, emphasizing the necessity not just to focus on dialogue dimensions but to analyze conversations as a whole in order to consequently obtain a more substantial comprehension of peer dialogue and interaction (Psaltis, 2015; Psaltis & Duveen, 2006, 2007; Psaltis et al., 2015).

Method

Previous Study

As mentioned above, research data originate from a previous experimental study including pre-test, intervention and post-test phases. The formal operation test BLOT (see Instruments) was used as *the pre-test* on the sample of 316 (12- and 14-year-old) students from 3 Belgrade primary schools. Afterwards 47 same-gender dyads were formed, in order to avoid potential gender influence on the interaction effects (Psaltis & Duveen, 2006; Zapiti & Psaltis, 2012, 2019). Competence difference across the dyads was approximately the same (around 1.5 logit units), done by Rasch analysis (Bond & Fox, 2013). In *the intervention phase*, each dyad solved 5 tasks from the parallel BLOT version (see Instruments). Tasks were selected so as to be below the ability of MC students (using Rasch analysis) and they provided correct answers in the pre-test, whereas their partners provided wrong ones since tasks were above their ability. The dyads received instructions to solve 5 tasks together and agree on a correct answer. Dyad members were not informed about the pre-test results because of the mentioned effects of social asymmetry on interaction course and its outcomes. For each dyad it was registered whether its members are friends or not (Table 1). This variable was just registered and not possible to control due to the fact that a primary factor for dyads selection was progression or regression of MC students. All dyad interactions were video recorded. *The post-test* was the same as the pre-test, conducted a month after the interaction phase. We had parents' consent for students to participate and IRB approval to conduct the study.

The present study

Sample

For the purpose of this study, 10 out of 47 dyads, participating in the study described above, were selected: 5 *in which MC students progressed, and 5 in which they regressed most* (Table 1). Progression or regression was represented by the calculated difference between MC students' scores on the post and pre-test.

Table 1
The 10 dyads including MC students who progressed/regressed most on the post-test

Dyad number	The post-test outcome of MC students	Difference between post-test and pre-test scores in MC students (in logit units)	Grade	Gender	Friendship between partners
1	Regression	-2.88	8	male	No
2	Regression	-1.63	6	male	Yes
3	Regression	-1.11	8	male	Yes
4	Regression	-.96	8	female	Yes
5	Regression	-.87	8	male	No
6	Progression	2.35	8	female	No
7	Progression	2.13	8	female	No
8	Progression	1.88	6	female	No
9	Progression	1.88	6	male	Yes
10	Progression	1.79	6	female	Yes

Design and Procedure

A mixed-method research design was applied. The relation between MC students' post-test performance and 10 dialogue dimensions (see Instruments) was quantitatively investigated in order to identify dialogue patterns associated with progression/regression of MC students. All dialogues were transcribed, and we traced the occurrence of 10 dialogue characteristics within each unit of analysis – peer dialogue covering one task solution. Since 10 dyads were selected and each dyad solved 5 tasks together, 50 dialogues were analyzed and every dialogue characteristic was registered between 0 and 50 times (see Table 3). Within each analysis unit more than one dimension was detected. The coding was performed independently by 2 observers (one author of the study and another researcher, blind for the research expectations) who watched video materials and read dialogue transcripts. Inter-rater agreement (Cohen's kappa .86) was acceptable for further data analyses, performed after moderating observers' disagreements.

Following quantitative analysis (*see* Data analysis), qualitative analysis was carried out on conversations of the 2 dyads established to be typical for identified dialogue patterns associated with progression and regression of MC students.

Instruments

BLOT is a multiple-choice test with good psychometrics characteristics (Bond, 1995, 1997) covering all formal operations described by Inhelder and Piaget (1958). It was previously established that BLOT in Serbian is acceptably similar to the English original (Stepanović, 2004). BLOT was used as a pre-test and post-test. For the *interaction phase*, where MC and LC students solved tasks together, the parallel version of BLOT was applied. It was constructed in a separate research (Stepanović Ilić et al., 2012).

Dialogue dimensions instrument – As mentioned before, 10 dialogue characteristics were extracted: 5 productive and 5 inhibiting. Table 2 shows the operationalization of each dimension and rationale for its use in this investigation. The examples illustrating each dimension are in Appendix 1.

Table 2
Extracted dialogue dimensions and their operationalization

Productive dimensions	
Operationalization	Theoretical/research foundation
Exchange of arguments – exchange of ideas about task solution, supporting opinion by elaborations.	Peer engagement in discussions as a source of logical thinking development (Piaget, 1947/1960; 1950/1999). "Exploratory talk" – incentive exchange and evaluation of peers' ideas (Rojas-Drummond & Mercer, 2003; Howe & Mercer, 2007; Mercer & Howe, 2012; Mercer & Littleton, 2007) Intensive peer dialogue as a factor of cognitive development (Forman & Larreamendy-Jones, 1995; Hennessy et al., 2016; Perret-Clermont, 2004; Roscoe & Chi, 2007, 2008; Shamir & Tzuriel, 2004; Tudge & Rogoff, 1990).
Shared socio-cognitive conflict – each participant openly states his/her task solution, which differ.	"Shared socio-cognitive conflict" – cognitive conflict accompanied by partners' awareness of their different opinions as a significant factor of cognitive advancement (Howe et al., 2005; Mercer & Littleton, 2007; Perret-Clermont, 2004; Psaltis, 2005).
Mediation – MC student guides a partner and adjusts his/her own behavior towards their partner's task understanding: asks question to test their understanding, points out relevant elements for task solution, corrects partner's mistakes while providing explanation.	Significance of adults' guidance for children cognitive development (Vygotsky, 1978). Importance of scaffolding for cognitive advancement of LC participants (Forman & Larreamendy-Jones, 1995; Kumpulainen & Kartinen, 2003; Rogoff, 1990; Tudge, 1992, 2000; Shamir & Tzuriel, 2004; Wertsch & Wertsch, 2009). Expert-children advancement associated with guidance of LC peers (Roscoe & Chi, 2007, 2008; Tartas et al., 2010, 2016).
Justification of the right answer by MC student – MC student explains the right solution, supports it by arguments and elaborations.	Significance of MC students' elaborated explanations for their progress (Roscoe & Chi, 2007, 2008; Webb 1982).
A-ha moment in MC student – MC student gains a new perspective on task solution, or better problem understanding, through a dialogue with a less competent peer	Cognitive progress as a result of new understanding of a problem as an outcome of peer interaction (Psaltis, 2005; Psaltis & Duveen, 2006, 2007).
Inhibiting dimensions	
Lack of cooperation between partners – one or both peers do not participate in problem solving, or peers are solving problem individually.	Interaction's negative (or no) influence on subjects not participating actively in a discussion and problem solving (Jovanović & Baucal, 2007, Stepanović 2010; Salomon & Globerson, 1989).
Non-shared socio-cognitive conflict – MC student states the right answer and less competent student does not provide his/her judgment.	Cognitive conflict is not visible and shared among peers, due to LC students' hesitation to express a different opinion (Psaltis, 2005).

Operationalization	Theoretical/research foundation
Inconsistent behavior of MC student – MC student's doubts regarding the right solution, changes his/her mind regarding a solution, gives a wrong answer, accepts a wrong solution offered by partner.	MC students' regression due to a lack of confidence in their own abilities (Tudge, 1989, 1992).
Dominance-submissiveness pattern Dominant attitude – imposing one's own perspective, limiting partner's communication space (verbally or non-verbally), disregarding partner's opinion or question, avoiding communication with their partner, choosing task solution without consulting the partner Submissive attitude – giving up one's own judgment (task solution) easily, accepting unexplained task solution, taking partner's opinion without questioning it, avoiding proposing task solution or giving opinion, withdrawing from communication.	Domination – tendency to win as much communication space as possible, which results in narrowing the space of other participants in a dialogue and disregarding other participants' needs and feelings (Buss & Craik, 1980; Tiedens & Fragale, 2003; Whiting & Edwards, 1973). Submissiveness – Withholding of expressing one's own judgments and needs, especially when others have an opposite opinion. Giving priority to authority or other people's needs and feelings over one's own. (Deluty, 1985). It can be a person's characteristic or behavior caused by the dominant attitude of the other person in a dialogue (Tiedens & Fragale, 2003). Social asymmetry often causes dominant behavior of one participant and submissive attitude of another (Leman & Duveen, 1999, Psaltis & Duveen, 2006; Verba & Winnykammen, 1992). MC students' awareness of their expertise provokes tendency to work individually during the interaction (Grossen et al., 1996; tartas et al., 2010, 2016).
Non-justified answer by MC student – MC student gives the correct answer without explanation.	Studies showing negative implications of such behavior on LC and MC students (Miller & Brownell, 1975; Roscoe & Chi, 2007, 2008; Silverman & Gairinger, 1973; Webb, 1982).

Data Analysis

The frequencies of dialogue characteristics are presented by using descriptive statistics. Subsequently, cluster, MANOVA and discriminative analyses were performed to detect dialogue patterns. The relationship between the MC students' post-test outcomes and derived clusters was tested by the contingency analysis. It was applied with the aim of examining the association between dyads' success in the joint task-solving as well as extracted clusters (dialogue patterns).

The qualitative part of the study covers two dyads as the most representative cases of the extracted dialogue patterns associated with opposite interaction outcomes of MC students. Conversational analysis (Arcidiacono et al., 2011; Goodwin, 1981; Sacks et al., 1974; Schegloff, 1991) was applied to dialogue transcriptions done according to Jefferson (2004).

Results

Quantitative Analysis

The most prominent dialogue characteristics were the inconsistent behavior of MC students, domination-submissiveness pattern, non-justified answer by MC student, shared socio-cognitive conflict and justification of the right answer by MC students (Table 3). Inhibiting characteristics prevail over the productive, appearing 71 times while the productive ones are registered only 22 times.

Table 3
Descriptive analysis of the appearance of 10 dialogue characteristics

Dialogue characteristics	*f* (Min = 0, Max = 50)	Percentage
Exchange of arguments (Argumentation)	2	4%
Shared socio-cognitive conflict (Shared SCC)	14	28%
Mediation by MC student (Mediation)	2	4%
Justification of the right answer by MC student (Justification)	13	26%
A-ha moment in MC student (A-ha)	1	4%
Lack of cooperation between partners (Lack of cooperation)	5	10%
Non-shared socio-cognitive conflict (Non-shared SCC)	12	24%
Inconsistent behavior of MC student (Inconsistent behavior)	23	46%
Domination-submissiveness pattern (Domination-submissiveness)	16	32%
Non-justified answer by MC student (Non-justification)	15	30%

Hierarchical cluster analysis (Figure 1) shows that the solution with two clusters presupposes the biggest distance between them.

Figure 1
Dendrogram showing results of cluster analysis

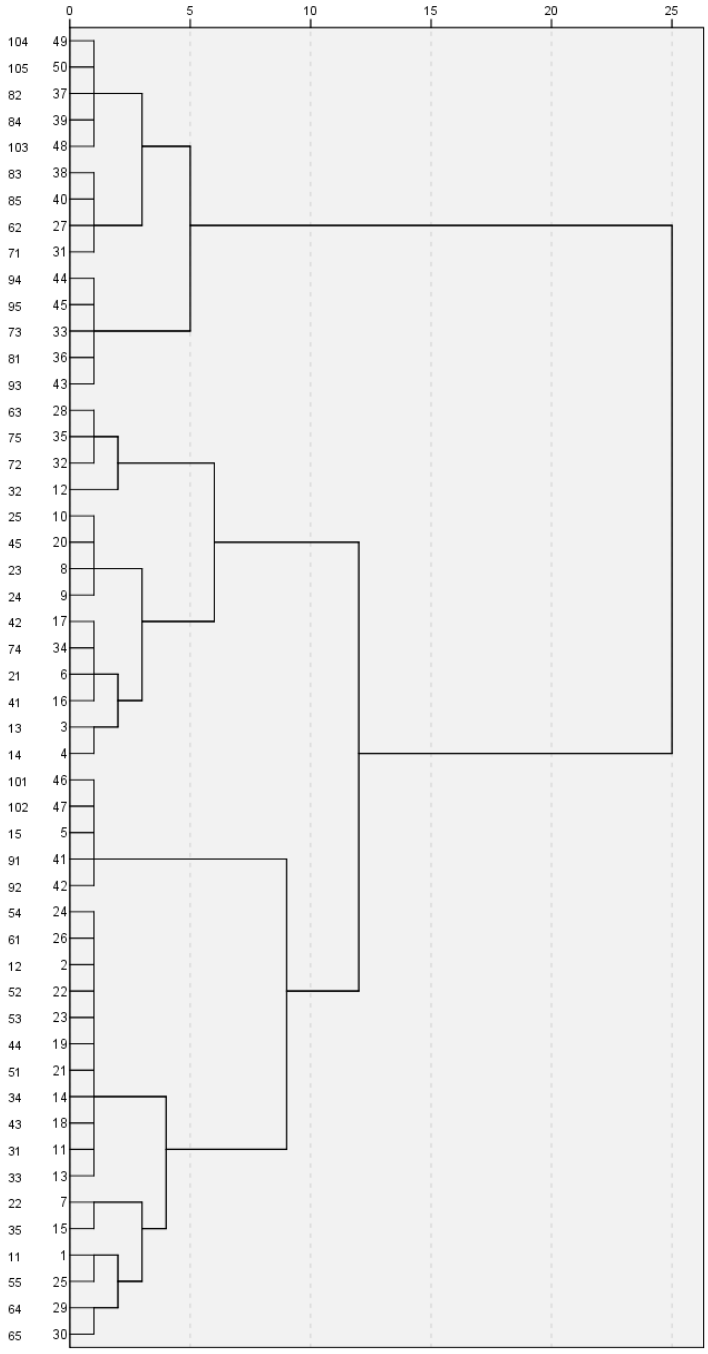
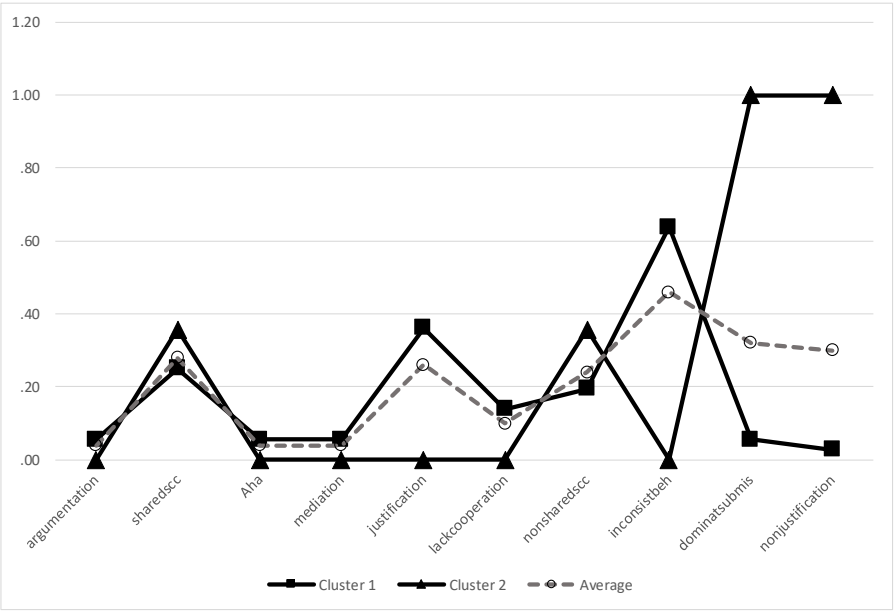


Figure 2 presents the probability for a certain dialogue dimension to be found in dialogues classified in two clusters. The greatest differences between the clusters are related to four dimensions: non-justified correct answer by MC students, domination-submissiveness pattern, inconsistent behavior of MC students, justification of the right answer by MC students. Hence, Cluster 1 describes the conversation pattern where MC students tried to explain their opinion regarding task solution but were not confident in their reasoning. On the other hand, Cluster 2 is mainly defined by the presence of domination-submissiveness conversation pattern where MC students were dominant and not willing to explain the correct answer, while their partners stood (Figure 2).

Figure 2
Dialogue dimensions relevant for defining Cluster 1 and Cluster 2



MANOVA shows that there is a statistically significant difference between two clusters (Wilks' $\lambda = .045$; $F(39, 10) = 82.303$; $p = .00$; Partial $\eta^2 = .955$) and confirms that four dialogue characteristics are significant for differentiating between them: justification of the right answer by MC student, the inconsistent behavior of MC student, domination-submissiveness pattern and non-justified answer by MC student (Table 4).

Table 4
Tests of Between-Subjects Effects

	Type III Sum of Squares	*df*	Mean Square	*F*	*p*	Partial ŋ²
Argumentation	.031	1	.031	.791	.378	.016
Shared SCC	.116	1	.116	.557	.459	.011
A-ha	.031	1	.031	.791	.378	.016
Mediation	.031	1	.031	.791	.378	.016
Justification	1.314	1	1.314	7.597	**.008**	.137
Lack of cooperation	.194	1	.194	2.168	.147	.043
Non-shared SCC	.267	1	.267	1.447	.235	.029
Inconsistent behavior	4.114	1	4.114	23.778	**.000**	.331
Domination-submissiveness	8.991	1	8.991	228.480	**.000**	.826
Non-justification	9.528	1	9.528	470.400	**.000**	.907

The solution obtained by linear discriminative analysis is similar to the MANOVA results. One discriminative function was extracted (Eigen-value = 21.103; Canonical correlation = .977; Wilks' $\lambda = .045$; $\chi^2 = 133.116$; $df = 10$; $p = .000$) and specified by following dialogue characteristics (Table 5): lack of cooperation, non-justification, inconsistent behavior, justification and domination-submissiveness pattern. It separates the two clusters substantially (the average dialogue score from Cluster 1 is 2.807, and from Cluster 2 is 7.218). Namely, 100% dialogues are correctly classified in two clusters, 36 in Cluster 1 and 14 in Cluster 2.

Table 5
Standardized Canonical Discriminative Function Coefficients

	Function 1
Lack of cooperation	**.861**
Non-justification	-.852
Inconsistent behavior	.709
Justification	**.498**
Domination-submissiveness	-.473
Argumentation	-.169
Non-shared SCC	-.101
A-ha	.093
Shared SCC	-.031
Mediation	.024

The contingency analysis was further performed to link the MC students' post-test outcomes with the extracted clusters. Table 6 shows that all regressing MC students had dialogues from Cluster 1, while 56% of those who progressed participated in dialogues from Cluster 2 (Pearson $\chi^2 = 19.444$; $df = 1$; $p = .00$; $\phi = .64$). This means that all regressing MC students were insecure and mostly willing to explain their correct reasoning when able to do so, while dominant ones not ready to justify their opinion to a submissive partner had greater chances of progressing than regressing.

Table 6
Contingency analysis results regarding the relationship between MC students' outcomes and the extracted clusters

			Clusters		Total
			Cluster 1	Cluster 2	
Interaction effect on MC student	Regression	Count	25	0	25
		Expected Count	18.0	7.0	25.0
		% of dialogues belonging to a particular cluster	**100.0%**	0.0%	100.0%
		Std. Residual	1.6	-2.6	
	Progression	Count	11	14	25
		Expected Count	18.0	7.0	25.0
		% of dialogues belonging to a particular cluster	44.0%	**56.0%**	100.0%
		Std. Residual	-1.6	2.6	
Total		Count	36	14	50
		Expected Count	36.0	14.0	50.0
		% of dialogues belonging to a particular cluster	72.0%	28.0%	100.0%

The same analysis was used to relate two dialogue types with the dyads' performance on joint tasks solution. The number of correctly completed tasks (1 = *correct answer*, 0 = *incorrect answer*) during the interaction was significantly different for the two clusters (Pearson $\chi^2 = 7.562$; $df = 1$; $p = .01$; $\phi = .39$). Namely, all 25 dialogues belonging to Cluster 2 led to a successfully solved task, while 61% of dialogues from Cluster 1 ended in that way (Table 7).

Table 7
Contingency analysis results regarding the relationship between dyads' success in solving interaction tasks and the extracted clusters

			Clusters		Total
			Cluster 1	Cluster 2	
The solution to interaction tasks	Incorrect	Count	14	0	14
		Expected Count	10.1	3.9	14.0
		% of dialogues belonging to a particular cluster	38.9%	0.0%	28.0%
		Std. Residual	1.2	-2.0	
	Correct	Count	22	14	36
		Expected Count	25.9	10.1	36.0
		% of dialogues belonging to a particular cluster	**61.1%**	**100.0%**	72.0%
		Std. Residual	-.8	1.2	
Total		Count	36	14	50
		Expected Count	36.0	14.0	50.0
		% of dialogues belonging to a particular cluster	100.0%	100.0%	100.0%

Qualitative Analysis

It was demonstrated that all dialogues of regressing MC students belong to Cluster 1 (Table 6). Therefore, the criterion for selecting the most representative dyads for qualitative analysis was based on the discriminant function value and the number of correctly solved interaction tasks. Hence, the MC student from Dyad 3 was chosen. This dyad solved just 1 task (see Table 8), and the discriminate function mean (2.96) for five interaction tasks was very close to the group centroid calculated for Cluster 1 dialogues (2.807). The MC student from Dyad 8 was selected as the most typical case since she participated in all dialogues from Cluster 2, found to be related to progression by contingency analysis. Besides, the discriminative function mean is remarkably close to the group centroid of Cluster 2, unlike in other progressing dyads. Since it is not possible to present all five dialogues of the selected dyads, the most illustrative ones are given and others shortly described in the following text.

Table 8
Data used for selecting two typical dyads for qualitative analysis

Dyad number	Post-test outcome of MC student	The number of correctly solved interaction tasks (out of 5)	Percentage of interaction task dialogues classified in Cluster 1	The mean of extracted discriminative function for 5 tasks i.e., dialogues
1	Regression	5	100.0	2.98
2	Regression	4	100.0	3.28
3	Regression	1	**100.0**	**2.96**
4	Regression	3	100.0	2.86
5	Regression	2	100.0	2.95
6	Progression	2	80.0	-.13
7	Progression	5	60.0	-1.12
8	Progression	5	**00.0**	**-7.18**
9	Progression	5	40.0	-3.95
10	Progression	5	40.0	-2.65

Dyad 3 consists of male 12-year-old students. The LC student is rather active and proposes task solutions more frequently than his partner. In the dialogue regarding Task 1 the MC student picks a wrong answer very quickly, not providing an explanation, and his partner approves (see the five interaction tasks for this dyad with correct answers marked in Appendix 2). The interaction regarding Task 2 is similar, but now, the LC student suggests a wrong answer and the MC student agrees. On these tasks MC student's inconsistent behavior manifests as choosing or accepting a wrong answer. Such behavior in Task 3 occurs as dismissing the right answer b (conversation turn 4) after the LC student's indecision between two answers (turn 1), and as the acceptance of a wrong answer again (turn 7).

Transcript 1

Dyad 3 – Task 3

1. [2]LC: "I think it is c."
2. (6.0) ((MC looks at the task))
3. LC: "it is b or c?"
4. MC: (.) it is not b ((MC still looks at the task))
5. LC: "Then c."
6. (5.0) ((MC looks at the task))
7. MC: "It is c!"
8. ((MC circles c))

In Task 4 the LC student proposes the right answer, while the MC is silent and looks at the test. The LC student starts to explain, reading two sentences which are crucial arguments for supporting his opinion. The MC student agrees and seems uncertain again, leaving the initiative to the partner and hesitating to agree with the right answer. This is the only task for which this dyad provided a correct answer. Notice that all 5 tasks were below the MC student's competence level. Some kind of "reverse" shared socio-cognitive conflict appears in Task 5, since the LC student proposes the right answer again (turns 1 and 3, Transcript 2) while the MC "inconsistently" suggests a wrong one (turn 2) upon which they agree rather quickly (turns 5–7).

Transcript 2

Dyad 3 – Task 5

1. LC: "Maybe c."
2. MC: "It is e."
3. LC: "I think it is c."
4. (3.0) *((MC looks at the task))*
5. LC: "You think e?"
6. *((MC agrees, nodding))*
7. LC: "Ok"
8. *((MC circles e))*

Although a feature of Cluster 1, we did not observe any justification of the right answer in the analyzed interaction, probably due to extreme uncertainty of the MC student, demonstrated in each dialogue.

Dyad 8 includes 12-year-old girls. The interactions are quite short, apparently because of the MC student's unwillingness to be involved in a discussion and to explain her opinion to the partner. She does not even talk to the partner most of the time. After reading Task 1 (see the interaction tasks

2 Dialogue turn numbers are labeled separately for each task.

for this dyad in Appendix 2) the LC student asks, "What's it to be?" while her partner just circles the right answer, not saying a word. The LC student approves immediately. In Task 2 the LC student proposes a different answer after MC already circled one without consulting her. However, MC sticks to hers pointing at previously circled answer and her partner eventually agrees. The dialogue in Task 3 is practically non-verbal, similar to the one regarding Task 1. In Task 4, the MC student pays attention to her partner for the first time (turn 1, Transcript 3). That interaction reveals some initiative coming from the LC student who suggests a wrong answer (turn 2). However, she quickly withdraws after her partner pointed a different, correct answer (turn 3).

Transcript 3

Dyad 8 – Task 4

1. ((MC is about to circle an answer, but she stops suddenly and looks at LC))
2. LC: "it is b˚ (.) What do you think?"
3. *((MC points to d with her finger)) (the correct answer)*
4. LC: "Ok."
5. *((MC circles d and pushes the test quickly to her partner as she wants her to explain))*
6. *((LC smiles as if she is embarrassed))*
7. LC: "Come on, you explain."

In the last conversation proposing the right answer, the MC student seems to consult her partner again (turn 1, Transcript 4). Actually, her intention appears not to be sincere or emphatic. On the contrary, the MC student looks as if she wants to embarrass the partner by raising her intonation, like she did it non-verbally in the previous dialogue (turn 5, Transcript 3). She starts to talk to her only to invite her to give an explanation to experimenter (turn 4, Transcript 4).

Transcript 4

Dyad 8 – Task 5

1. ((MC points c))
2. ((*LC nods))*
3. ((*MC circles c))*
4. MC: "Come on now you!"
5. LC: "oh (.) come on (.) you"

Discussion

The goal of this study was to establish characteristics of asymmetrical peer interaction associated with various outcomes of MC students. The findings confirmed our expectations, based on the importance of peer conversation

highlighted by authors from Piagetian and socio-cultural approaches, according to which it is possible to distinguish dialogue types related to progression and regression of MC students. Hence, Cluster and MANOVA analyses determined two dialogue patterns. In the first one, MC students are rather insecure in their judgment but ready to explain their right answers to partners, when they are able provide it. In the second conversation pattern MC students manifest dominant behavior and unwillingness to justify their opinion while their LC peers are prone to submissiveness.

Contingency analysis shows that *all more competent students who regressed* participated in a dialogue pattern 1 demonstrating their readiness to justify their opinion to a less competent partner, but their dominant characteristic was uncertainty i.e., behavior inconsistent with their higher competences. This is in accordance with Tudge's (1989, 1992) description of regressing MC students. Relying on theoretical and research grounds (Galbraith & Winterbottom, 2011; Roscoe & Chi, 2007, 2008; Vygotsky, 1978; Webb 1982; Yuill et al., 2009) we expected that justifying answers, labeled as productive, would enable MC students to reflect upon their thinking and advance accordingly. That did not happen possibly because explanations they gave were somewhat short (as the one illustrated in Appendix 1) and more like "knowledge telling explanations" found by Roscoe and Chi (2008) as the dominant type in untrained tutors. In such explanations tutors mainly state the facts tutees already know, providing little elaboration. It was previously established that task characteristics affect interactional dynamics (Perret-Clermont, 2004; Salomon & Globerson, 1989, Tudge 1989). Hence, it is likely that multiple-choice questions, like the ones we had, do not encourage extensive debate and elaborate explanations by MC students, associated with their cognitive advancement (Galbraith & Winterbottom, 2011; Roscoe & Chi, 2007, 2008). Qualitative analysis suggests that MC students' uncertainty prevailed and that asymmetrical peer interaction represented a big disruption for them. Conversational analysis of Dyad 3 indicates that our MC students do not just have doubts as Tudge (1989, 1992) described, but they also tend to offer a wrong answer or to accept incorrect ones given by their less competent partners. Tudge (1992) interprets the inconsistent behavior of MC students by fragility of their cognitive structures subjected to external disturbances from a dialogue with a LC peer. Such disturbance was noticed in the peer dialogue presented in Transcript 1. However, in Transcript 2 we registered the situation where the MC student presented with the correct answer by his partner proposes a wrong one. Such a finding, as well as previously mentioned external disturbances, might be related to Piagetian notion of cognitive stage, specifically with a preparation period needed for a new structure consolidation as a relatively unstable developmental phase (Barinerd, 1978; Flavell & Wohlwill, 1969; Gruber, & Vonèche, 1977; Lourenço, 2016). Namely, the important contribution of conversational analysis is related to the finding that providing the correct answer by MC students may not be based on their comprehension (see Transcript 2) i.e., to the fact that their pre-test performance

does not necessarily reflect student competence but rather their performance. This factor could be responsible for a relatively small number of the tasks solved by regressing MC students and their partners. Namely, despite MC student competences to solve all interaction tasks, diagnosed by Rasch analysis of their pre-test results, contingency analysis shows that less than two-thirds of those engaged in dialogue pattern 1 succeeded in doing that during the interaction with LC partner (Table 7).

The results do not support our implicit assumption that dialogue dimensions identified as productive regarding LC students' interaction outcomes in previous investigations would also be associated with advancement of MC students. Namely, more than half of *more competent students who progressed* were engaged in the dialogue distinguished by their domination and unwillingness to provide arguments for their answers, accompanied frequently by their partners' submissiveness (Cluster 2). In our opinion, absence of MC students readiness to explain their answers to the partners could not be easily explained by the variable describing peers socializing status (Table 1, the last column) since the members of the two (dyads No. 9 and 10) out of three dyads having the biggest number of dialogues from Cluster 2 (i.e., the smallest number of those from Cluster 1, see Table 8) are friends. Dominant attitude of MC students and their individualistic tendencies during interaction, as well as LC participants' submissiveness, are registered by authors highlighting the influence of social asymmetry on interactional dynamics (Grossen et al, 1996; Tartas et al., 2010, 2016; Verba & Winnykammen, 1992). The identified dialogue pattern (Cluster 2) connected with MC students' progression shows an absence of constructive dialogue and collaboration. This is even more obvious in findings of conversational analysis. In presented dialogues of Dyad 8 (Transcripts 3 and 4) non-verbal exchange prevails over verbal, due to the MC student's reluctance to communicate with her classmate. Additionally, the LC girl's submissiveness is quite apparent because of her readiness to accept her partner's non-justified answers, expressed mainly by gestures. Contrary to the findings showing that exchange of arguments and shared socio-cognitive conflict are dialogue aspects important for LC students' cognitive growth (Hennessy et al., 2016; Mercer & Littleton, 2007; Perret-Clermont, 2004; Psaltis, 2005; Tudge & Rogoff, 1999) we established that hugely different conversation dimensions were associated with MC students' improvement. It transpires that by preventing exchange of opinions and limiting partner's participation in a dialogue, MC students manage to establish their authority which gives them space to practice and improve their competence without interruption. This is in accordance with Baucal's (2013) claim that interaction context could enhance co-construction, but individual construction as well. Moreover, our findings additionally support the importance of social status for peer interaction course and outcomes outlined by Social Genevans (Perret-Clermont, 1980, 2004, 2015; Psaltis, 2005; Psaltis & Zapiti, 2014). Contingency analysis shows that all dyads leading described conversation were successful in joint task solution.

Conclusion

In our opinion this study has enriched the understanding of asymmetrical peer interaction effects on MC students and provided insights useful for further research. In addition, we consider the focus on early adolescents particularly important since research into younger respondents dominates this field. We consider mixed method design, combining quantitative and qualitative analysis, successful since the first kind of analysis enabled us to identify the two ways in which asymmetrical peer interaction could influence MC students' cognitive development, and qualitative analysis helped us reach a more structured comprehension of the discovered dialogue motives and expectedly of mechanisms behind them responsible for different interaction outcomes. Practical relevance of this investigation is mostly connected with the finding that dimensions deemed to be productive rarely appeared in spontaneous peer dialogues. It implies that MC students should be taught to become proper guides as some studies indicated (Roscoe & Chi, 2007, 2008; Tartas et al., 2010, 2016) and Mercer and associates showed in their "exploratory talk" (Rojas-Drummond & Mercer, 2003; Howe & Mercer, 2007; Mercer & Howe, 2012; Mercer & Littleton, 2007). Such training would make them promoters of LC peers' learning but would also result in their progress, as suggested in studies considering tutor gains (Roscoe & Chi, 2007, 2008).

Limitations of presented findings are associated with the following facts: the first is a relatively small number of analyzed cases (10 dyads). Thus, future research should include more dyads and provide control of socializing status of members, although our results do not indicate a significant contribution of this variable to the obtained results. The second is related to the participants' perceptions and meaning associated with investigation setting and broader social context, which influence peer interaction and research findings (Müller Mirza et al., 2003, Baucal & Stepanović, 2006; Grossen, 1994; Perret-Clermont, 2004). Being video recorded in front of an unknown experimenter is not an ordinary situation for young adolescents, and it definitely affected their behavior and dialogue during interaction. Besides, in a short interview preceding the intervention, students claimed that peer learning and joint task solving is very rare in their classrooms (Stepanović, 2010), which made the used experiment procedure additionally artificial. The third limitation is related to, already discussed, consequences of the specific i.e. multiple-choice tasks on interactional dynamics, probably responsible for short dialogues between peers. It is highly likely that peer exchange would be richer and more extensive if they solved open-ended tasks instead.

Respectfully, future research should be designed to overcome the mentioned limitations in order to validate our results concerning the dialogue characteristics connected with different MC students' interaction outcomes, especially those related to cognitive growth, and if confirmed to contribute to their further theoretical elaboration.

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Zašto kompetentniji adolescenti napreduju ili nazaduju nakon asimetrične vršnjačke interakcije: ispitivanje karakteristika dijaloga koje prave tu razliku

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U ovom istraživanju se ispituju razlike između manje i više kompetentnih vršnjaka (više kompetentnih u smislu da su uspešniji u rešavanju problemskih zadataka koji su korišćeni u istraživanju, prim. prev) u dijalozima koji se odnose na rešavanje problema, a u vezi sa suprotnim ishodima interkacije kod kompetentnijih adolescenata (napredak/nazadovanje). Od 47 asimetričnih dijada, koje su učestvovale u prethodnom istraživanju, izabrano je 10: pet u kojima su kompetentiji učenici najviše napredovali nakon posttesta i pet u kojima su kompetentniji učenici najviše nazadovali. Iz 50 razgovora ovih dijada izvedeno je deset karakteristika dijaloga. Klaster analiza je ukazala na dve vrste dijaloga koji su povezani sa različitim ishodima interakcije za kompetentnije učenike. U prvoj vrsti dijaloga, kompetentniji učenici su opravdavali tačne odogovore, ali im je ponašanje bilo u neskladu sa višim kompetencijama koje su imali. Drugi klaster karakteriše obrazac dominacije-potčinjavanja i nespremnost kompetentnijih učenika da opravdaju svoje odgovore. Svi učenici iz grupe viših kompetencija koji su nazadovali pripadaju prvom tipu dijaloga, a 56% onih koji su napredovali drugom. Kvalitativna anliza konverzacija tipična za ekstrahovane klastere ukazuje da, iako spremni da ponude argumente svojim vršnjacima, kada to mogu, učenici koji su nazadovali su pokazivali nesigurnost, gubeći tako od interakcije (sa svojim vršnjakom nižih kompetencija, prim. prev.). Čini se da su učenici koji su napredovali štitili sebe od mogućih narušavanja interakcije dominantnim stavom i povlačenjem iz komunikacije.

Ključne reči: vršnjačka interakcija, dijade, vršnjački dijalog

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