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The Effects of Collectivism-Individualism on the Cooperative Learning of Motor Skill

Yi Luo, PhD Candidate
Yan Sun, PhD Candidate
Learning Design and Technology, Curriculum and Instruction
Purdue University (USA)

Johannes Strobel, PhD
Assistant Professor, Engineering Education & Learning Design and Technology
Purdue University (USA)

Abstract

This study examined how cultural background (collectivism vs. individualism) affects motor skill learning in a dyadic cooperative learning environment. The research context of this study was Nintendo™ Wii Tennis. Twenty college students from a Midwestern university participated in the study, among whom half were from an individualistic culture (USA) and the other half were from a collectivistic culture (China). In the study, the participants from these two backgrounds demonstrated different interaction levels and behavioral predispositions in the cooperative learning of motor skills. Both participants of individualistic background and of collectivistic background had made significant progress in the post-exercise as compared to the pre-exercise, which corroborated the benefits of cooperative learning on motor skill learning. Nevertheless, the progress made by the participants of individualistic background was statistically larger than that made by the participants of collectivistic background. Implications and limitations of this study are discussed.

Keywords: dyadic cooperative learning, motor skills, Nintendo™ Wii Tennis

According to Rapport and Overing (2000), culture is a system of shared beliefs, norms, assumptions, knowledge, values, or practice. Learners from different cultures may develop different feelings, attitudes, and thoughts during cooperating learning process because of the culture-related values, beliefs, mindsets, dispositions and competencies carried along by the learners.

Individualism-collectivism, together with power distance, masculinity-femininity, uncertainty avoidance, and short-long vs. term-time orientation, form the five cultural dimensions (Hofstede & Hofstede, 2005). As compared with individualists who are self-driven, people who come from collectivistic cultures value group norms and goals more and they are interdependent within their groups (Hofstede, 2001). According to Hofstede (2001), such differences between individualists and collectivists have impact on cooperative learning results, which makes the relationship between cultural backgrounds and cooperative learning a worthwhile research topic to explore. Although research regarding the influence of cultures on cooperative learning in general education is well documented in the literature (Shwalb & Shwalb, 1995; Nguyen, Terlouw, & Pilot, 2006), little research has been done to explore how cultural backgrounds would influence learners' learning of motor skills in a cooperative learning environment especially at college level. The present study was intended to fill the gap by investigating the cooperative learning of motor skills of college learners coming from collectivistic and individualistic cultures. It was hoped that findings from this study would help shed some light on our understanding about the relationship between cultural backgrounds and motor skill learning results in a cooperative learning environment.

This study sought to answer the research question: How does cultural background (collectivism vs. individualism) affect motor skill learning performance in a dyadic cooperative learning environment? Two

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hypotheses were tested in this study:

H_1: Collectivism positively affects motor skill learning performance in a dyadic cooperative learning environment.

H_2: Individualism negatively affects motor skill learning performance in a dyadic cooperative learning environment.

Literature Review

Cooperative learning of motor skills

Cooperative learning is a structured process in which students are actively engaged in learning activities in groups and are rewarded based on group performance (Slavin, 1980). Cooperative learning includes the following five elements (Johnson, Johnson, & Smith, 2006): 1) Positive interdependence: group members rely on one another to achieve the goal. Everyone suffers the consequences if any group member fails to complete their task; 2) Individual accountability: all group members are held accountable for doing their share of the work and for leaning the materials; 3) Face-to-face promotive interaction: although some of the group work may be done individually, some must be done interactively; 4) Interpersonal and small group skills: students are to develop and practice trust-building, decision-making, communication and conflict management skills; 5) Group processing: group members set group goals, periodically assess what they are doing well as a team and identify changes they need to make in order to work more effectively in the future.

A large amount of empirical evidence shows that cooperative learning significantly increases academic performance and achievement, and has positive effects on social constructs such as peer relations and self-esteem (Johnson, Johnson, & Holubec, 1998; Johnson, Johnson, & Smith, 1998; Williamson & Rowe, 2002; Salkind & Rasmussen, 2008). Slavin (1996) summarized the four major theoretical perspectives that explain the effects of cooperative learning. Motivational perspectives focus on the motivation that students gain through engaging in helping the group to be rewarded as a group. Social cohesion perspectives see the effects of cooperative learning as related to the group cohesiveness resulting from teambuilding activities. Developmental perspectives suggest cooperative learning greatly benefits from the interaction with more capable peers which could stimulate learning in zone of proximal development (ZPD). Cognitive elaboration perspectives claim that cooperative learning enhances learning outcomes by involving students in restructuring and elaborating when explaining the material to group members.

In the field of motor skill learning, the small amount of existing research indicates that cooperative learning could enhance motor skills (Johnson & Ward, 2001; Barrett, 2005; Goudas & Magotsiou, 2009) even for learners with severe and multiple disabilities (Hunt, Staut, Alwell, & Goetz, 1992). The research studies referenced above were set in different contexts like the cooperative learning environment in general education classrooms of math, language, and social studies in Hunt and his colleagues' study (1992) and the physical education classes in Barrett's study (2005) using the structure of Performer and Coach Earn Rewards based on the three elements of cooperative learning (i.e., cooperative interaction, individual accountability, and positive interdependence). Despite the differences of the research contexts of the above studies, their participants were unanimously 1^{st} - 6^{th} graders. Compared with young children, how students at college level develop motor skills in cooperative learning environment has not drawn much attention from researchers. This is understandable because of the importance of motor skills to young children in various ways (e.g., Epstein, 2007; Gallahue, 1993; Piaget, 1950).

Huang (2000) reported in his study conducted among 156 undergraduates that video-instruction based cooperating learning environment have positive effects on the students' golf swing skills. The results of the study indicated interpersonal feedback is the most powerful and effective source of instructional information for developing motor skills. Occasional empirical work like the one by Huang (2000) reveals that motor skill learning research on college students, unlike that on young children, should focus on more sophisticated and specialized motor skills like golf or tennis playing skills and that how different cooperative learning contexts could help the development of such motor skills is an area worth our research attention. Motor skills have not been given enough research attention because cognitive skills are always the main research target in university settings. A body of research connects strongly cognitive learning with motor skill development, such as working memory and attention (Niederer et al., 2011), high ability and math

(Ziegler & Stoeger, 2010) and the function of motor skills for regaining cognitive function (Fong, Chan, & Au, 2001). These evidence-based connections between cognitive and motor skills underscore the need of paying more research attention to motor skills acquisition at the college level.

Individualism vs. Collectivism and Cooperative Learning

Individualism-collectivism is one of the five dimensions of culture (i.e., power distance, Individualism-collectivism masculinity-femininity, uncertainty avoidance, and short-long vs. term-time orientation) (Hofstede & Hofstede, 2005). According to Triandis (1995), collectivism and individualism can be defined by the four attributes: 1) the meaning of the self; 2) the structure of goals; 3) behavior as a function of norms and attitudes; and 4) focus on the needs of the in-group or social exchange. Table 1 provides a brief summary of the differences between collectivism and individualism based on the above four attributes:

The psychology of the individualistic cultures of the West differs to some extent from the psychology of the collectivist cultures of the East (Triandis, 1996). China, for example, a typical collectivistic culture (Hofstede, 1984), considers direct confrontation inappropriate and something to be avoided and it is impolite to disagree with someone's opinion in class. People will disagree with other in a more private and personal environment to protect their classmates from losing face. In contrast, the U.S., as a typical individualistic culture, encourages students to be self-reliant, competitive, directive, and pursue their personal goals while open disagreement with fellow students may not only be the norm but even expected (Hofstede, 1986).

Cultural variables play a significant role in student performance (Eisenburg, 1999). In terms of learning as related to the cultural variables of collectivism and individualism, Hofstede (1980) made some clear contrasts between collectivistic and individualistic cultures. A collectivistic student normally will not speak up unless personally invited by the teacher, while individualists often voluntarily participate in discussions; collectivists do not want either the teacher or students to lose face while individualists are tolerant of obvious mistakes and can apologize in public. In addition, it is hypothesized that collectivism and individualism are related to one's learning style in such a way that the more collectivistic a society, the higher the tendency of learning approach to be surface and strategic will be (Manikutty, Anuradha, & Hansen, 20007). This hypothesis is based on a comprehensive review of cross-cultural research literature on collectivism and individualism.

As to the relationship between collectivism-individualism and cooperative learning, Nguyen, Terlouw, and Pilot (2005) argued that while collectivist mentality strongly support cooperation, guarantees group success, and ensures learners' best performance in groups, individualism can lead to negative relationships and thus affect the effectiveness of cooperative learning. However, some collectivistic learner characteristics lend support to the counter argument that cooperative learning would not work well for collectivistic learners. Johnson and Johnson (1994) pointed out that cooperative learning entitled face-to-face promotive interaction, which includes challenging each other's conclusions and reasoning

Table 1

The Differences Between Collectivism and Individualism (Triandis, 1996)

	Collectivism	Individualism
The meaning of the self	The self is defined as an aspect of a collective.	The self is defined as independent and autonomous from collectives.
The structure of goals	Personal goals are subordinated to the goals of this collective.	Personal goals are given priority over the goals of collectives.
Behavior as a function of norms and attitudes	More weight is given to norms than to attitudes as determinants of social behavior.	More weight is given to attitudes than to norms as determinants of social behavior.
Focus on the needs of the in-group or social exchange	Collectivists engage in communal relationships. If a relationship is desirable from the point of view of the in-group but costly from the point of view of the individual, the relationship is likely to be kept.	Individualists engage in exchange relationships. The perceived profit and loss from a social behavior is computed, and when a relationship is too costly it is dropped.

while seeking mutual benefit. However, such promotive interaction is not quite possible among collectivists because learners from collectivist cultures have all the restrictions of losing face and are trying to avoid disagreements to maintain harmony within the group (Nguyen et al, 2005).

In individualistic societies, group work is a place of confrontation and search for solutions. In collectivist societies, however, an individual may fail to differentiate between what is expected to be his work and what should be the group's activities. Students in collectivistic culture, such as Chinese students, prefer to be spoon-fed by the teacher and do not learn well when discovering for themselves (Wong, 2004). Such a characteristic predetermines that cooperative learning environment would not result in good learning effects. In addition, the grouping of students would be more difficult in collectivist cultures (Economides, 2008) which makes cooperative learning hard to be implemented.

The above conflicting views about the relationship between collectivism-individualism and cooperating learning call for more research on this area for a better understanding. Such a call together with the severe paucity in the research on the effect of collectivism-individualism on learners' cooperative learning of motor skills would make the present study a worthwhile endeavor. The acquisition of sophisticated and specialized motor skills is as important for college level students as the acquisition of simple and basic motor skills is for young children. And the learning environment at college may be more culturally diverse than in K-12 settings. It is hoped that results from this study would help shed light on the influence of collectivistic and individualistic backgrounds on college students' acquisition of motor skills in a cooperative learning environment and thus allow college faculty to locate effective means to facilitate the acquisition of motor skills by culturally diverse college students.

Research Methods

The purpose of this research study is to find out if cultural background (collectivism vs. individualism) affects motor skill learning performance in a dyadic cooperative learning environment. Therefore the following two hypotheses were put forward:

H_1: Collectivism positively affects motor skill learning performance in a dyadic cooperative learning environment.

H_2: Individualism negatively affects motor skill learning performance in a dyadic cooperative learning environment.

Participants

The participants in this study were 20 students (age 20-31) from a Midwestern university, 7 males and 13 females. We recruited the participants through convenience sampling. The participants were acquaintances of the researchers, but they did not necessarily know each other. None of the participants had ever played Nintendo™ Wii Tennis before. Ten were international students from China, which is described as a collectivist culture (Hofstede, 1984), and the other 10 were from the USA, a country, which is characterized as an individualistic culture (Hofstede, 1980). The Chinese participants had stayed in the U.S. for two years at the most. We grouped the participants based on their cultural background of collectivism and individualism. Participants in each cultural background were randomly divided into five cooperative learning dyads. All of them completed eight sessions (see procedure section). One of the researchers served as the grader in these sessions. The study was carried out in an Educational Gaming Lab.

Research Context

The research context of this study is Nintendo™ Wii Sports, as it is a multisensory game that trains motor abilities (Selvinen, 2008). Previous research has consistently indicated that playing computer games increases reaction times and improves hand-eye coordination (Lawrence, 1986). Nintendo™'s Wii Sports is one of the latest generations of video games consoles and incorporates a number of innovative features. The Wii Remote is a wireless controller that is able to detect motion and rotation in three dimensions, which allows players to control elements of the game, such as tennis rackets, by pointing at the image on the screen and moving their arm and hands (Pearson & Bailey, 2007). Video games also offer a more social approach to learning and collaboration because studies suggested that important skills such as communication and collaboration may be built or reinforced by them (Bailey, Pearson, Gkatzidou & Green, 2006). Accordingly, with a focus on learners' different cultural backgrounds, this research aims at studying the cooperative learning of motor skills through playing Nintendo™ Wii Tennis.

Table 2

The Allotted Time for the Eight Tennis Playing Sessions

	Activity	Allotted Time
Session 1	The Questionnaire of Individualism-Collectivism	5 min
Session 2	Orientation	5 min
Session 3	Pre-exercise	10 min
Session 4-5	One Plays, One Observes	20 min
Session 6	Teamwork	10 min
Session 7	Post-exercise	10 min (30 min after session 6)
Session 8	The Attitude Questionnaire	5 min
	Total	95 min

Materials

Materials used in this study include the Nintendo™ Wii Tennis game; an established and tested questionnaire measuring participants' individualism-collectivism (Wagner, 1995) (see appendix I); instructions (see appendix II); participants' performance sheets recording their baseline performance tennis scores in the pre-exercise and their post-exercise tennis scores; cooperative data card recording participants interaction in the exercise sessions the attitudinal questionnaire.

Procedure

Session 1: The Questionnaire of Individualism-Collectivism. In the first session of this study, the participants were asked to fill out a survey to determine their individualism and collectivism. This survey was validated by Wagner (1995) to measure personal differences in individualism-collectivism. According to Wagner, the items in the survey were from Wagner and Moch (1986), Erez and Earley (1987), and Triandis, Bontempo, Villareal, Asai, and Lucca (1988).

Session 2: Orientation. All the participants were gathered to receive the instructions about this study. After the orientation, the 10 pairs participated in the study in a row. Only one pair was allowed to enter the Educational Gaming Lab at a time.

Session 3: Pre-exercise. Prior to grouping-up, participants were tested on their individual Nintendo™ Wii Tennis skill. As the participants might have played tennis or other Nintendo™ Wii sports games before, they were tested to see if their baseline skills of playing Nintendo™ Wii Tennis were significantly different. Each participant was asked to play a 3-round Nintendo™ Wii Tennis game with a guest figures with 0 skill level. At the end of pre-exercise session, the grader documented each participant's baseline performance tennis score.

Session 4 – 6: Exercises sessions. In the fourth, fifth and sixth sessions, each pair played three sets of Nintendo™ Wii Tennis game in a row. The exercises session lasted about 30 minutes. The participants cooperated with their partner to figure out ways to improve their skills. Each set included a 3-round Nintendo™ Wii Tennis game. In the first set, one participant in a pair played against the computer, while the other one acted as an observer and provided suggestions on how to play. Roles within a pair were exchanged in the second set, that is, the player in the first set turned in to an observer while the observer in the first set acted as a player at this time. In the third set, each pair participated together in a game against the computer, during which partners could work together to improve their skills. A "cooperation data card" was used by two researchers to document participants' performance throughout session 4-6 so that participants were repeatedly measured in these sessions.

Session 4 & 5: One Plays, One Observes. A "cooperation data card" was used to examine participants' performance in the process of cooperative learning. The data card included categories of behaviors that the researcher checked each time when one occurred. The coded behaviors of partner interactions included: Encouragement, Dis-encouragement (negative feedback), Explanations, Physical Explanations, Questions Asked, and Answers Given. The grader examined and noted down each pair's work according to their interactive performance.

Session 6: Teamwork. The participants played with their partners in a 3-round Nintendo™ Wii Tennis game against a computer-assigned opponent pair. The opponent pair selected by Nintendo™ Wii Tennis program for 0 level players consisted of 2 players, who were level 69 and 36 respectively. The graders also examined and recorded each pair's performance

according to the cooperation data card.

Session 7: Post-exercise. This session was held 30 minutes after the exercise session; participants were tested on their individual Nintendo™ Wii Tennis skill in a 3-round game as in the pre-exercise. In particular, the total Nintendo™ Wii Tennis level score of each pair assigned by the computer was recorded to examine their achievement on cooperative learning.

Session 8: The Attitude Questionnaire. In addition to the learning and behavioral measures, the participant were asked to fill out an attitudinal questionnaire (7-point Likert scale with 1 = strongly disagree to 7 = strongly agree) anonymously rating how they felt about their experience in the study. This questionnaire covers three aspects: participants' overall motivation, comfort level in cooperation, and perceived improvement. The researchers developed and validated the items by a factor analysis.

Results

The survey on Individualism-Collectivism

The questionnaire measuring participants' individualism and collectivism works in such a way that a higher score (out of 140) indicates a higher degree of collectivism. Significant difference was detected between the two groups, $t(16) = -36.478$, $p=.003$. The 10 American participants demonstrated a tendency towards individualism with scores ranging from 61 to 80, while the 10 Chinese participants showed a tendency towards collectivism with scores ranging from 91 to 129. No significant difference was found among the two groups in regards to individualism and collectivism, $t(18) = -14.181$, $p=.258$. However it is noticed that the SD for individualistic groups was 1.80 while the SD for collectivistic groups was 3.39. When examining the data closely, it is found that there was an outlier in the collectivistic group with a value of 91 and an outlier in the individualistic group with a value of 80. After deleting there two outliers, significant difference was detected. Thus, the expected different tendencies toward cultures between the American and Chinese groups were identified. The two outliers were not removed from the data because we only wanted to demonstrate participants' tendencies toward the two cultures.

Pre-exercise

No significant difference was found among the groups of the collectivistic and individualistic conditions, with regard to their initial level scores on the pre-exercise, $t(18) = -0.63$, $p=.303$. Thus, we considered the collectivistic and individualistic groups equivalent in terms of their Nintendo™ Wii playing skills at the start of this study.

Post-exercise

In order to find out the effects of cultural backgrounds on task performance, we first examined each condition's performance improvement from pre-exercise to post-exercise separately, then compared both conditions' performance in post-exercise, and finally compared both conditions to see whether one group improved significantly more than the other.

To examine the performance improvement in both conditions, we first conducted paired t-tests of the scores from pre-exercise to post-exercise in each condition. Results revealed statistically significant improvement in the condition of collectivist culture, $t(9)=-3.753$, $p=.005$. Meanwhile we also found significant improvement in the condition of individualist culture. $t(9)=-3.155$, $p=0.012$.

We also conducted an independent t-test on the post-exercise scores of both conditions to get a between subject comparison. Significant difference was found, $t(18)=-2.054$, $p=.000$. The individualistic groups performed better than the collectivist groups in the post-exercise.

To examine the effects of culture on players' performance improvement, we conducted an independent t-test on the score difference between pre-exercise and post-exercise of both conditions to see whether one condition improved significantly more than the other.. This analysis showed significant effect of culture difference on learning improvement ($t(18) = -2.306$, $p = .001$). The means and standard deviations are listed in Table 3.

From the pre-post exercise comparison with standard error bars demonstrated in Figure 1, we notice that the improvements made by the individualistic group in the post-exercise is larger than the collectivistic group whereas with a larger standard error. Since the participants' pre-exercise baseline Nintendo™ Wii Tennis scores were not significantly different from each other, the figure indicates that the collectivistic participants who had higher scores in pre-exercise might have improved their tennis-playing skills relatively less in the cooperative learning process

Table 3

Means and Standard Deviations for Improvement on Level Score from pre-exercise to post-exercise

Variable		Conditions	
		Collectivism	Individualism
Pre-exercise Score	M	8.20	9.80
	SD	4.52	6.65
	SE	1.43	2.10
Post-exercise Score	M	14.80	35.90
	SD	7.11	31.69
	SE	2.25	10.02
Improvement on Level Score (Level of Post-exercise – Level of Pre-exercise)	M	6.60	26.10
	SD	5.56	2.62

Table 4

Means and Standard Deviations for Level of Cooperative Engagement

Variable		Conditions	
		Collectivism	Individualism
Number of encouragement	M	5.20	7.80
	SD	1.48	3.70
Number of discouragement	M	0	0
	SD	N/A	N/A
Number of oral explanation	M	4.40	6.00
	SD	1.52	2.35
Number of physical explanation	M	0.20	3.40
	SD	0.45	1.52
Number of questions asked	M	6.80	10.00
	SD	1.79	1.58
Number of answers given	M	6.80	11.20
	SD	1.79	1.30

Table 5

Means and Standard Deviations of Motivation Level, Comfort Level and Perceived Improvement

Variable		Conditions	
		Collectivism	Individualism
Overall Motivation for Game	M	6.08	5.75
	SD	0.60	1.79
Comfort Level in Cooperation	M	5.45	5.85
	SD	1.14	1.87
Perceived Improvement	M	5.35	5.60
	SD	1.11	1.74

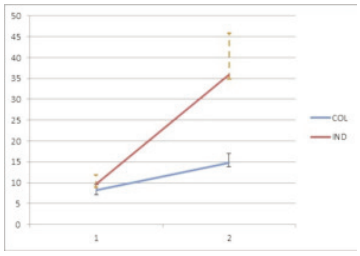
as compared to their individualistic counterparts who had higher scores in pre-exercise.

Effects of Individualism-Collectivism on Cooperative Engagement

Frequencies of the cooperative behaviors among 10 dyadic groups observed during sessions 4 to 6 helped to measure if differences in cultures influence the level of engagement in cooperative learning environment. The inter-rater reliability between the two graders was 0.771, which is deemed a high acceptability rate (Cicchetti & Sparrow, 1981). Means and standard deviations for these measures are provided in Table 4.

Both the groups of collectivistic condition and individualistic condition demonstrated no

Figure 1
Results of Using Standard Error Bars to Represent Comparison Between Two Conditions' Improvement



Note. Means and standard error bars for improvement on level score from pre-exercise to post-exercise of the collectivistic groups and individualistic groups.

discouragement behavior. There were no significant differences between the two conditions on measures of the number of oral explanation, the number of questions asked and the number of answers given. However, there was a significant difference between the two conditions with regard to the number of encouragement ($t(8)$=-1.458, p=.032). Specifically, the participants from individualistic cultures gave more encouragement to their partners compared to those from the culture of collectivism. Moreover, there were some differences, not significant but worth noticing, between the two conditions. An independent t-test revealed a marginally significant difference in the number of physical explanations being given during the exercise session ($t(8)$=-4.525, p=0.081), which suggested relatively more physical explanations were given from the players of individualism.

Effects on Motivation, Comfort Level in Cooperation, and Perceived Improvement

The differences between conditions in the perception of cooperative learning on Nintendo™ Wii Tennis were examined. The relative means and standard deviations are presented in Table 5.

Overall motivation measures. The first four items in the Attitude Questionnaire measure how the participants enjoyed this game and to what extent they were motivated to play. The scores of the four items were averaged to one measure of overall motivation level for the game considering the high correlation between these four measures (Cronbach's Alpha =.941). An independent t-test revealed no significant difference between the two conditions ($t(18)$=-.544, p=.177).

Comfort level in cooperation. We asked players how encouraging they found their partners and to what extent they felt at ease to communicate with their partners (item 5, 6). Similarly, we averaged the two measures to a single measure of comfort level in cooperation (Cronbach's Alpha =.948). The analysis showed there was no significant difference between two conditions ($t(18)$=-.577, p=.378).

Perceived improvement. The last two items in the Attitude Questionnaire (Cronbach's Alpha =.803) are about the participants' perception of their current improvement and potential improvement if given more time to cooperate with their partners (question 7, 8). We didn't find any significant difference between two conditions ($t(18)$=-.383, p=.576).

Discussion

In this study, we found players from collectivistic and individualistic cultures did show different interaction levels and behavioral predispositions in the cooperative learning of motor skills.

In the exercise session, identical instruction was given to participants in both conditions, who were encouraged to cooperate with their partners to improve each other's Nintendo™ Wii Tennis skills. Through careful observation, we found that players from individualistic culture more quickly developed team cohesion and interacted with partners more during the whole session. The data we recorded with the Cooperative Data Card regarding the participants' cooperative engagement during the session are basically in line with our observation. As we could see from Table 4, the means of five measures (number of encouragement, number of oral explanation, number of physical explanation, number of questions asked, number of answers given) in individualistic culture are greater than that of collectivist culture, which suggested that players from individualistic culture tend to engage in cooperative environment more easily and deeply.

Results as such from this study are rather understandable given that Chinese students are reported in the literature having "spoon-feeding" style of learning (Wong, 2004) and thus being passive in the learning process. The above results carry the implication that, in a college level multi-cultural cooperative learning environment where there are learners from individualistic culture and collectivistic culture, a good instructional strategy is to group individualistic and collectivistic learners together.

Mixing the types of learners in one group, we might expect more encouragement, oral and physical explanations, and questions and answers from individualistic group members would help promote the positive interdependence and face-to-face promotive interactions (Johnson, Johnson, & Smith, 2006) among the group members and consequently improve the learning results.

In this study, we also examined the learning outcomes of participants in both conditions in cooperative learning. Both the individualistic group and the collectivistic group had made significant progress between the pre-exercise and post-exercise, which corroborates the benefits of cooperative learning on motor skill learning. Nevertheless, it is shown in this that the individualistic groups performed better than the collectivist groups in the post-exercise and made statistically larger progress in the tennis exercise scores. Such results contradict Nguyen and his colleagues' (2005) argument that collectivists work better than individualists in cooperative learning environment. The difference in individualists' and collectivists' group work styles may be at work in bringing about the above results: people from collectivist cultures are more concerned about maintaining harmonious relationship within the group, and tend to retreat from potential disagreement and confrontation, which results in lower level of engagement and interaction in cooperative environment; in contrast, group goal replaces self-interest to become the driving force for individualists, whose perception of being self-reliant encourages them to make their contributions to the group outcome. Moreover, members from individualistic culture perceive group work as a place of confrontation and search for solutions, and regard task more important than relationship (Economides, 2008), which might make them freer to provide feedback and challenge each other in order to achieve the group goal.

If the above discussed difference in individualists' and collectivists' group work styles contributed to the difference in their performance in this study, it would be a challenge trying to group these two types of learners together in a cooperative motor skill learning environment. As suggested earlier, grouping individualistic and collectivistic learners together would promote the positive interdependence and face-to-face promotive interactions and ultimately improve the motor skill learning results. However, affective dissonance may occur among the learners because of the difference in their group style and the learning outcome may consequently be undermined. To prevent the potential negative effects on learning outcomes, instructors would find it advisable to set up clearly stated group work rules that guide confrontation and disagreement towards positive and constructive ways to minimize negative personal impact while maximize the possibility of achieving the group goals.

As was indicated by the data from the Cooperative Data Card, participants from the individualistic culture gave more encouragement, oral and physical explanations, and questions and answers. If these contributed to the individualistic participants' better performance in this study, we would conclude that the results from our study confirm Huang's (2000) finding that interpersonal feedback is most effective for motor skill learning. As the participants were assigned to pairs randomly after the pre-exercise, the reason, which may account for a larger improvements in individualistic group, might be that in their culture "winning is everything". A tendency to put more emphasis on "winning is everything" in individualistic culture as compared in collectivistic culture was demonstrated in the aforementioned survey on Individualism-Collectivism. Therefore individualistic participants took the study very seriously and tried their best to perform in the tennis game. This might also explain why there was a larger standard error in individualistic participants' performance in the post-exercise: the better performing individualistic players tried their best as well as the fair performing individualistic players. On the other hand, within the collectivistic pairs, as their culture advocates harmony, modesty and mutual progress, it might be the case that even if the better players were interested in winning, they tended not to exert all their efforts in the tennis game.

The questionnaire, which was administered to players after post-exercise, revealed no significant difference in the measures of motivation, comfort level during cooperation and perceived improvement. However, the high mean values of measures of both conditions' attitudes toward the learning experience showed they generally enjoyed the cooperative learning process. In this sense, we might say that behavioral pre-dispositions rather than attitudes associated with individualistic and collectivistic groups play a larger role in determine the motor skill learning differences between an individualist and a collectivist.

Conclusion

We failed to support our hypotheses. Rather, our findings favor the opposite of our original hypotheses, which suggests that individualism may positively affect motor skill learning in cooperative environments.

To better interpret our findings, and suggest future research, we examined the potential limitations of our study. As the total number of participants was relatively low and the participants in this study worked in pairs rather than larger groups, which are more common in cooperative learning environment, such research design sets a limitation on the generalizability of the findings from this study. Moreover, due to the limitations in the research process of this study, we only had an exercise session of around 30 minutes for each group before examining their improvement on Nintendo™ Wii Tennis skills. The time period was relatively short for players to establish team cohesion to work together effectively. There might be the possibility that collectivist players had not fully warmed up because they were more reserved than players from individualistic background, which could greatly influence their cooperative behaviors. Although we found significant differences in the progress level of the individualistic and collectivistic cultures in cooperative motor skill learning environment, whether the overall higher level of preference for sports in individualistic culture (specifically American culture in this study) had played a role in this result remains unknown. Further research is suggested to rule out these potential confounding variables to examine the effect of cultures on cooperative learning of motor skills.

In addition, from the study, we could see a strong tendency that individualistic players progress more in cooperative learning; however, it's still premature to infer that individualism benefits general motor skill learning more than collectivism. Nintendo™ Wii Tennis as a kind of recreational activity, only involves a few kinds of motor skills such as hand-eye coordination and direction control. Other kinds of motor skills, such as balance, strength, agility, and flexibility may show different relationships with culture and cooperative learning. Research in genuine sports settings can further examine these issues.

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About the Authors:

Yi Luo is a PhD candidate in Learning, Design, and Technology at Purdue University. Her research interests include collaborative/cooperative learning and online learning. E-mail: luo21@purdue.edu

Yan Sun is a PhD candidate in learning, Design, and Technology at Purdue University. Her research interests include adoption and diffusion of elementary engineering teaching, and professional development of elementary engineering education.

Dr. Johannes Strobel is an assistant professor in College of Education at Purdue University. His research focuses on the intersection between learning and technology. He is interested in designing and integrating open-ended, problem-based learning environments into curricula, social computing applications in education (including game-based approaches).

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