

How Children Synchronize with Their Teacher: Evidence from a Real-World Elementary School Classroom

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Abstract—This paper reports on how synchrony occurs between children and their teacher, and what prevents or facilitates synchrony. The aim of the experiment conducted in this study was to precisely analyze their movements and synchrony and reveal the process of synchrony in a real-world classroom. Specifically, the experiment was conducted for around 20 minutes during an English as a foreign language (EFL) lesson. The participants were 11 fourth-grade school children and their classroom teacher in a public elementary school in Japan. Previous researchers assert that synchrony causes the state of flow in a class. For checking the level of flow, Short Flow State Scale (SFSS) was adopted. The experimental procedure had four steps: 1) The teacher read aloud the first half of an English storybook to the children. Both the teacher and the children were at their own desks. 2) The children were subjected to an SFSS check. 3) The teacher read aloud the remaining half of the storybook to the children. She made the children remove their desks before reading. 4) The children were again subjected to an SFSS check. The movements of all participants were recorded with a video camera. From the movement analysis, it was found that the children synchronized better with the teacher in Step 3 than in Step 1, and that the teacher's movement became free and outstanding without a desk. This implies that the desk acted as a barrier between the children and the teacher. Removal of this barrier resulted in the children's reactions becoming synchronized with those of the teacher. The SFSS results proved that the children experienced more flow without a barrier than with a barrier. Apparently, synchrony is what caused flow or social emotions in the classroom. The main conclusion is that synchrony leads to cognitive outcomes such as children's academic performance in EFL learning.

Keywords—Movement synchrony, teacher-child relationships, English as a foreign language, EFL learning.

I. INTRODUCTION

THE place where a teacher teaches students is called a classroom. In elementary schools in Japan, the class size is generally around 30–40 pupils and it is too big. It is generally recognized that the smaller the class size, the better. The smallest possible class size would be personal lessons from a teacher to a student. However, personal lessons can never beat class lessons in one aspect—"mood," or as it is sometimes called, "flow" or rapport. Students are stimulated or motivated to study by the class mood, and its power sometimes exceeds the merits of personal lessons. Nevertheless, it is also possible for a class to be filled with a bad mood, thus demotivating children. Although studies on motivation have reported various

factors and methodologies, they have not succeeded in solving all the problems that many teachers face in real-world classrooms. Possibly, solutions to many of these problems might depend on each teacher's experiences, unconscious skills, or personality. For inexperienced teachers, it is more helpful to suggest them some basic and simple methods. The team behind this research, consisting of an applied linguistics researcher (author) and elementary school teachers, has started to implement the project in a real-world classroom.

II. LITERATURE REVIEW

When children interact with their teacher, they move their bodies in the same way as the teacher does and with the same rhythm [1]. This reaction is defined as "synchrony"; in a classroom, it is necessary for children to connect with each other during activities [1]. There is evidence that synchrony is an innate and fundamentally necessary part of the human ability to engage in social interactions with other people, since people complete certain shared communication tasks in each other's presence [2]. Synchrony studies first confirmed that a child physically synchronizes with an adult who is talking to him/her [3]. Next, the studies also proved that a person synchronizes with a person who is not talking to him/her but to someone else, and changes his/her body movements or timing slightly [4]. This explains why children synchronize with their teacher despite the fact that the teacher cannot talk to each child in a classroom.

The most effective teaching occurs when teachers and children are in synchrony with each other. Teaching is a natural cognitive activity that requires human interaction [5]. Moreover, synchrony can generally facilitate the performance of cognitive or linguistic tasks [6].

It is well known that children like chorus, chanting, or moving their bodies. Many elementary school teachers point that the class mood improves after such activities. Further, movement synchrony influences the rating of rapport [7]. Movement synchrony is a fundamental means for humans to form a social unit with others [8]. Flow is defined as the state in which people are focused in an activity too much to pay attention to anything else. In other words, people find the experience itself so enjoyable that they will do it even at greatest cost [9]. In this study, this state is evaluated as the result of increased synchrony in a classroom.

The significant question is how teachers can cause children's synchrony on purpose. First, children should open their body and learn with every part of their body. Teachers should not

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teach but facilitate children's learning [10]. As teachers have few experiences of being facilitated to open their bodies, it is hard for them to imagine what being facilitated is like. Teacher training coordinators should take this factor into account and introduce workshops in teacher training courses, wherein participants can experience the role of students and get facilitated by a lecturer to open their bodies and learn with every part of their body [10]. It is also recommended to devise various space arrangements as part of more specific methods: Setting a learning space, keeping adequate distance with others, arranging desks and chairs adequately, and facing each other with one's whole body [11]. It would be worthwhile to examine the effects of such specific methods on synchrony in real-world elementary school classrooms.

III. HYPOTHESES

In order to facilitate children's synchrony with their teacher, the space arrangement in a classroom is key. As an arrangement of desks in a classroom, a semicircle effectively generates students' synchrony with their teacher [12]. It is common in elementary schools in Japan to arrange children's desks in a semicircle. Some teachers even remove desks in some activities. This study values this practice highly because it leads to the removal of a barrier between the children and their teacher and makes adequate space for each student to move. Therefore, the following hypotheses are made in this study:

- 1) Children's synchrony with their teacher changes depending on the presence or absence of a barrier.
- 2) Children's synchrony influences the rating of flow in an EFL class.

The goal of this study is to prove these hypotheses true.

IV. METHODOLOGY

A. Participants

The participants of the experiment conducted in this study were 11 fourth-grade students and their classroom teacher at a public elementary school in Japan. They had a good relationship with one another, and no students had any problems in their physical status.

B. Procedure

The students' desks were arranged in a semicircle surrounding their teacher (Fig. 1).

The experiment was conducted during an EFL lesson. Storytelling was chosen as the activity for the class, because it involves three kinds of simultaneous actions: 1) multimodal face-to-face interaction, 2) multimodal density (speech, gesture, bodies), and 3) modal intensity (voice, stress, accents, etc.) [13]. The roles played by all such actions in generating children's synchrony appropriately were evaluated. The storybook used in the activity was *Today's Monday* by Eric Carle, Big Book version. This particular book was chosen because it helps children understand the story despite their poor English skills as it includes not only attractive pictures but also several easy and rhythmical rhymes.

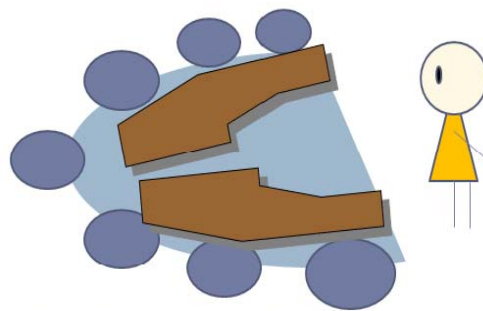


Fig. 1 Desk arrangement (1)

First, the teacher read aloud to the children the first half of the story, sometimes asking questions or facilitating their repeating. Before reading the remaining half of the story, the teacher made the children remove their desks and just sit on their chairs (Fig. 2).

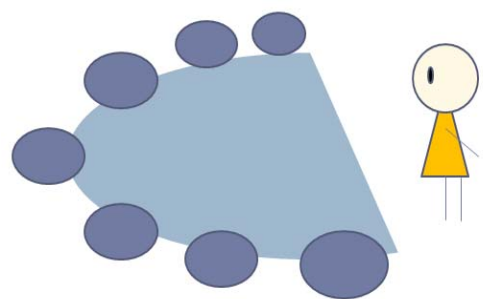


Fig. 2 Desk arrangement (2)

For checking the level of flow, SFSS [14] was adopted. SFSS consists of nine items and five-point Likert scales. Each item was rewritten into an easier form so that the fourth-grade students could understand them (see Table I).

TABLE I
 ITEMS IN THE SFSS

1	I am capable of doing the task.
2	I unconsciously got involved in the task.
3	I eagerly tried to do well.
4	I tried to devise my way of doing well.
5	I concentrated on the task.
6	I never felt I was forced to do.
7	I had no anxiety how I am judged by others.
8	Time passed by faster than usual.
9	It is fun to do the same movement together.

The experiment had four steps:

- 1) Storytelling of the first half of the story with desks (Fig. 1),
- 2) SFSS pre-check,
- 3) Storytelling of the remaining half of the story without desks (Fig. 2) and,
- 4) SFSS post-check.

Step 1 and Step 2 were recorded with a video camera. The experiment was conducted for around 20 minutes, with 10 minutes allotted for both Step 1 and Step 2.

C. Results

The children answered each item in the SFSS in either a yes or a no. The scale was converted into points (Yes: 1 point; No: 0 points). Average scores and standard deviation of pre- and post-check on the nine items are listed in Table II.

TABLE II
 AVERAGE SCORES OF PRE- AND POST-CHECK ON NINE ITEMS

	N	M	SD
PRE	11	4.727	2.493
POST	11	5.636	2.203

In Fig. 3, the average scores of the children are compared for each item.

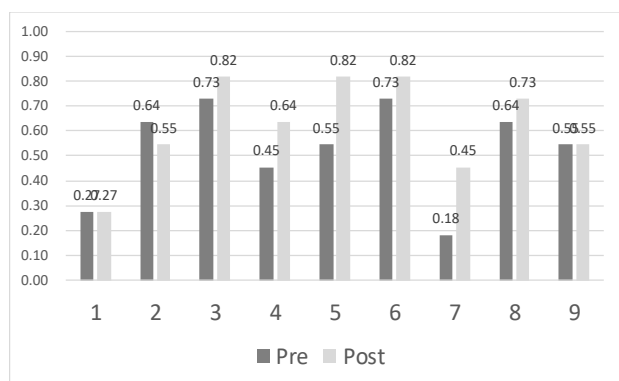


Fig. 3 Comparison of pre- and post-check scores of nine items

Pre- and post-check scores were compared and analyzed statistically. The effect size was large ($r = 0.55$), and statistical significance between the pre- and post-check scores was found (see Table III).

TABLE III
 RESULTS OF T-TEST

Pre and Post	
<i>t</i>	2.085
<i>df</i>	10
<i>p</i>	0.064
<i>r</i>	0.55

Effect size: Large

The children's movement during the activities was also analyzed from the recorded videos. In Step 1, they listened to the teacher's storytelling with desks. Their posture while listening is illustrated in Fig. 4.

The children sometimes moved their hands or head slightly, but they almost maintained the same posture. Their posture while listening in Step 3 is illustrated in Fig. 5.

It was observed that after the desks were removed, the children freely moved their bodies in the absence of the barrier. Moreover, they reacted to the utterances or movements of the teacher. Interestingly, the teacher's movement became free and outstanding with the change in the students' movements. The movements of five children are described in detail in Fig. 5: Child A leaned forward and backward rhythmically, Child B patted her lap with the teacher's rhythm, Child C and Child D

leaned forward and nodded repeatedly, and Child E swayed from side to side.

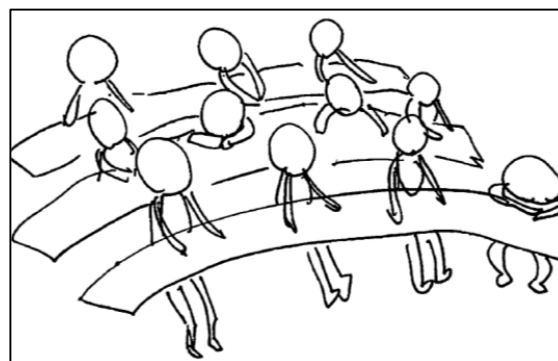


Fig. 4 Children's posture in Step 1

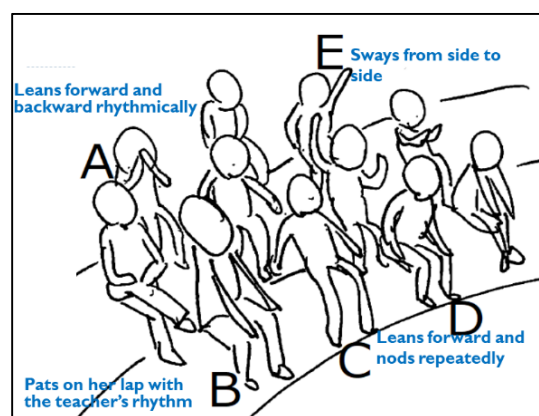


Fig. 5 Children's posture in Step 3

V. FINDINGS

The post-check SFSS scores exceeded the pre-check scores in six out of the nine items. The statistical analysis revealed significant differences in the total scores of the nine items. The biggest difference between the pre- and post-check scores was observed for Item 5 ('I concentrated on the task') and Item 7 ('I had no anxiety about how I am judged by others'). These findings imply that the children concentrated more on their task without a barrier than with a barrier. Moreover, they felt less anxious about how they are judged by others without a barrier.

Further, the observations clearly showed that the children synchronized with the teacher's rhythmical reading and movements better without a barrier than with a barrier. While the story was written with the intention of causing synchrony in native English-speaking children, it succeeded in causing synchrony in non-native children too.

VI. CONCLUSION

This study proposed two hypotheses. The first one was that children's synchrony with their teacher changes depending on the presence or absence of a barrier. The observations during storytelling in an EFL class in a real-world elementary school revealed changes in the movement of fourth-grade students. Synchrony of the children with their teacher improved after the

barrier was removed. Consequently, the first hypothesis was proved.

The second hypothesis was that children's synchrony influences the rating of flow in an EFL class. The results of the experiment conducted using SFSS showed that the average post-check score was greater than the average pre-check score, with significant differences between the two. This clearly indicates that the children felt more flow in the class without a barrier than with a barrier. Accordingly, the second hypothesis was also proved.

Homeroom teachers in Japanese elementary schools are facing difficulties, such as big class sizes, and EFL teaching becoming a burden for teachers suffering from anxiety regarding lack of language skills. It is not compulsory in Japan to have English skills to obtain an elementary school teacher license. Thanks to the positive results of this study, there is a high likelihood that this research can be used to remove their anxiety to teach EFL and give them confidence as professional elementary school teachers who can nurture good teacher-child relationships and motivate the students to move freely with their bodies and senses in a classroom.

In future studies, it is necessary to develop other concrete methods to generate synchrony in a class in addition to the already available ones such as setting appropriate learning spaces or devising tasks such as storytelling. It can be concluded that synchrony leads to cognitive or linguistic outcomes such as good academic performance in children's learning, even in subjects that require high cognitive abilities such as EFL.

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