

Short Report

## Effectiveness of the Physical Structure for an Individual with Autism

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### Abstract

This study examined the effectiveness of physical structure for an individual with autism. Physical structure is one of the main components of Structured Teaching based on TEACCH approach. To evaluate the efficacy of the physical structure, we compared the individual's 'leaving' behavior between pre- and post intervention by using physical structure. The results demonstrated that the intervention was effective for the individual. A decreased average of 'leaving' was noted in each task. This suggests that individuals with autism can be helped to make more sense of physical environment and develop their attention by addressing physical structure.

### Introduction

Division TEACCH (Treatment and Education of Autistic and related Communication handicapped Children) was established in 1966 as part of the department of Psychiatry of the School of Medicine at the University of North Carolina in the USA. This program is North Carolina's state wide program serving individuals with autism and their families.

Through the program's experiences over 40 years, TEACCH has evolved its own treatment strategy and approach to work with individuals with autism and their families. This strategy and approach has been implemented throughout the USA and all over the world.

This approach, called Structured Teaching, originated with Division TEACCH's recognition of autism as a developmental disorder. Individuals with autism have many important similarities in the areas of social interaction, communication, perseveration and conceptualization. Structured Teaching was designed to address the major neurological differences in autism. Individuals with autism generally have much stronger visual skills compared with their auditory skills. By using the idea of Structured Teaching, such individuals are able to utilize their strength. Presenting information and instruction visually makes things more meaningful for individuals with autism and enables them to function more independently and to learn. The purpose of Structured Teaching is to increase their independence and to manage behavior by considering the cognitive skills, needs and interests of individuals with autism and adjusting the environment accordingly [1]. Physical structure, schedules, work system, and visual structure are the central components of this approach.

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A number of studies have been made to demonstrate the effectiveness of Structured Teaching. Schopler et al. (1971) examined the effectiveness of structured teaching by altering the degree of structure in a teaching program for students with autism. The students improved attending, relatedness, affect and general behavior in the structured learning environment [2]. Similarly, Ozonoff and Cathcart (1998) evaluated the effectiveness of structured teaching program for young children with autism. Their study compared two matched groups of children to evaluate the efficacy of the program in 11 subjects. The children in the treatment group improved significantly more than those in control group on all outcome measures after approximately four months of training [3]. Short (1984) demonstrated the effects of the structured teaching by comparing children behaviors in pre- and post structured teaching parent training. The children whose parents received intensive structured teaching training showed increase in appropriate behaviors, especially in the area of appropriate play or work and communication [4]. Several of the many countries adopting Structured Teaching have initiated outcome studies to evaluate this approach [5]. For example, Sines (1995–6), was sponsored by the Department of Health and Social Services and other affiliated agencies in Northern Ireland as part of pilot project, reported the comprehensiveness and effectiveness of structured teaching. In Sweden, sponsored by the Swedish National Autism Society, Durnik (1996) reported that the participants and professionals found the structured teaching techniques to be very useful in their ongoing work, especially suggestions about structure, teaching independence, teaching social skills, and enhancing communication.

In Japan, TEACCH strategy and approach were first introduced in 1982. TEACCH strategy and approach, in comparison with the United States and Europe, has evolved through feedback from frontline staff working at institutions or schools for the mentally retarded [6, 7]. Although this approach has been implemented rapidly with realization of efficacy for individuals with autism, little attention has been given to study about the effectiveness of Structured Teaching except in case studies in Japan.

The purpose of this study is to examine the effectiveness of physical structure for an individual with autism as an example of the effectiveness of Structured Teaching.

## Method

### 1. Participant

One individual with autism participated in this study. Taro is a 25-year-old male with autism and learning difficulties. He is a resident of an institution for mental retarded adolescents. He has limit comprehension of verbal language but can follow an instructions by short sentence. He understands pictures or photograph cards and written words with hiragana or katakana. He can use one word or a very short phrase to communicate to others what he wants. He likes to read magazines and draw pictures in his spare time. He insists on routine and the positions of common objects and sometimes becomes aggressive to others if he gets confused by changes in his routine and daily activities. He spends most of the time each day at the workplace in the institution and has four tasks a day. Before intervention, he quite often wandered around during his working schedule.

### 2. Setting

Taro's intervention took place at the workplace in the institution. He belonged to a workgroup with nine other residents with autism or mental retardation. In the workplace, each resident had an independent work area. The workplace had a play area and lavatory. The play area had a TV and videos, a few books, magazines, and puzzles but some toys were put on the shelf of another area. Most of the residents spent their time watching videos at the play area after lunch and only few residents spent time in the play area

during other intermissions. The residents could overlook the entire workplace from the play area.

### 3. Procedure

The participant was observed at his workplace while he was working on his tasks except at lunchtime. To examine the effectiveness of the physical structure, an observer counted the number of times of his 'leaving' during pre- and post intervention. The term 'leaving' was defined as a movement of going away from one place to another place. The observer worked with other frontline staff as an additional staff of the workgroup. The participant was observed 13.4 hours in total for five days during pre- intervention by using physical structure. He was also observed 11.7 hours in total for four days during post intervention.

#### *Physical structure*

Before intervention, the physical environment of the entire workplace was not clearly defined for some residents including him. Taro's independent work area was arranged at the farthest desk from the entrance of the workplace and the lavatory. Thus, visual stimulation fascinated him especially when he went to the toilet or wandered around.

By intervention, his work desk was placed near the entrance and lavatory as well as the play area being moved next to his independent work area. Some screens surrounded his independent work area to reduce distractions. To associate specific activities with specific places, a shelf was positioned beside the play area as a partition and some toys were placed in the shelf.

### Results

Figure.1 shows the average of 'leaving' times per minute during pre- and post intervention. The 'leaving' rate is indicated by the average per minute in this study in order to consider the difference of the observation period between pre- and post intervention. The average of 'leaving' times during pre-intervention is 0.426 times per minute and during post intervention is 0.165 times per minute. The result indicates a decrease after physical structure.

The average of 'leaving' times per minute in each task appears in Figure.2. The particular rates of 'leaving' of each task during pre- and post intervention are shown in Table 1. In each task, the results indicate decreases in the average of 'leaving' during post intervention compared with pre-intervention.

The decrease of the average 'leaving' rate on the chi-square test is significantly related to the physical structure ( $\chi^2 = 67.915$ ,  $p < 0.001$ ).

As noted above, the decrease of the 'leaving' rate results from the physical structure for this participant.

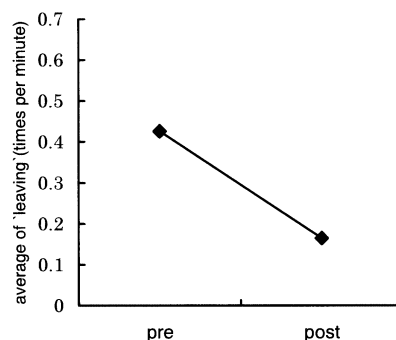


Fig. 1 Average of 'leaving' times per minute during pre- and post intervention

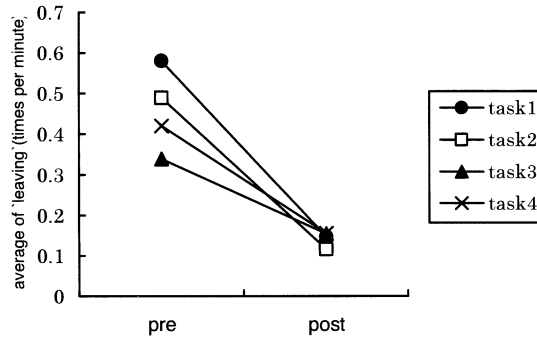


Fig. 2 Average of 'leaving' times per minute in each task during pre- and post intervention

Table 1 Average of 'leaving' times per minute in each task during pre- and post intervention

1) The average of 'leaving' times per minute in each task during pre-intervention.

2) The average of 'leaving' times per minute in each task during post intervention.

	pre <sup>1)</sup>	post <sup>2)</sup>
task1	0.580	0.147
task2	0.489	0.116
task3	0.339	0.154
task4	0.420	0.155

## Discussion

The results demonstrated that the intervention using physical structure was effective for the participant. A decrease in the average of 'leaving' was noted in each task. These results show that the participant made more sense of understanding the physical context in the physical structured environment. It is reasonable to suppose that the decreased 'leaving' rate resulted from the participant's comprehension of the purpose of the environment by using physical structure. Arranging physical environment by surrounding his work area with a screen helped him to understand this area and decrease the visual stimulation that could be distracting and troublesome for him.

However, the same physical environment would not always be effective on other individuals with autism. Physical structure in this study was designed just for Taro. Requirements relating to physical structure vary among individuals. Staff or teachers working with autism must make a careful assessment of their needs and levels of physical structure.

On the grounds that the results of physical structure for the participant, individuals with autism can be helped to make more sense of physical environment and develop their attention by addressing physical structure.

## Conclusions

In the present study, we clarified the effectiveness of physical structure for an individual with autism. Physical structure can clarify what is expected in certain areas. The purpose of physical structure is not to coerce them into staying in the specific area according to the daily activity of institution. The focus is to promote independent functioning by physically structuring the environment with careful consideration of the individual's conceptual and sensory needs.

This study reports only the effectiveness of physical structure which is one of the components of Struc-

tured Teaching for this participant. We need to examine the effectiveness of Structured Teaching by using scientific methodology in future studies.

Finally, only few attempts have been made so far at examining the effectiveness of Structured Teaching in Japan. Further research by practitioners of this evidence-based approach should clarify the effectiveness of Structured Teaching.

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