



Implementing shaping and differential reinforcement technique in helping children with language difficulty

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Abstract

This paper reports on the implementation of shaping and differential reinforcement technique to help a child who struggles in his school activity due to language difficulty. The intervention was conducted in total of 21 session with, 15 main treatment session, 3 session in the beginning of the treatment for baseline measurement and 3 sessions in the end of the treatment for follow-up measurement. Each session lasts 45 to 60 minutes for four weeks. The treatment employs a combination of shaping and differential reinforcement due to the nature of the difficulty faced by the participant. Changes in time spent on assignment and grade was recorded on each session. This study uses single-subject experimental design with baseline as pre-test and follow-up session as post-test. The study participant was Rudi, a boy aged 8. He's a 3rd grade student at local primary school. The result of this study indicates that the intervention program was able to reduce time spent on assignment as the participants is less inclined to do non-assignment related activity or exhibit disruptive behavior compared to baseline. Further, Rudi's grade also showed significant increase during the process and follow-up measurement.

Keywords: *Shaping; Differential Reinforcement; Language Difficulty; Primary School Student*

Suggested citation

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Introduction

Language remains as a cornerstone in supporting academic performance. Students who have clinical difficulties in understanding, or producing language, or simply has difficult time understanding the language of instruction used by their teacher shows lower academic achievement and loss in grade points (Bernhofer & Tonin, 2022; Molyaningrum & Suyata, 2021).

Rudi (Pseudonym), Indonesian boy aged 8 years 6 month 12 days was referred for intervention because teacher complained Rudi has difficulties in comprehending Indonesian language (Bahasa Indonesia) and it affects his school performance. At the time of intervention, Rudi was attending 3rd grade of elementary school. Intake interview was conducted with his parents and teacher.

When asked about the history behind his difficulty, teacher stated that Rudi speaks Indonesian at home, however Rudi never learns or receive Bahasa Indonesia lesson before. Thus, Rudi is not familiar with formal form of Bahasa Indonesia used in school setting. Previously Rudi went to local school in Belgium due to his parents' work. When his father was transferred to work, he follows his parents and transferred school to his current school. Teacher reported that during his first month he can communicate well with his teacher and peers. However, when it came to learning he struggles to comprehend formal Indonesian language used in every textbook, instruction for assignment and examination questions. He did not experience difficulties in solving mathematical problems, but when the problem presented as narratives he would be struggling. The researcher then asked the teacher to describe Rudi's difficulty in detail to get a good picture of his behavior. Teacher then describes as following:

“During lessons he can follow teacher's explanation, actively participates in discussion, and being assertive when he doesn't understand”.

Problem usually starts when teacher assign him to work on individual assignment. His teacher described his performance as inconsistent and works really slowly because of this difficulty. When he feels he cannot understand the question or how to answer the question he usually would just stares at the book and say *“Saya pusing/I'm having headache”* (a common Indonesian expression of frustration).” According to the teacher at this point he would usually give up working on the assignment or gives any answer he could think of to finish with the assignment. The teacher asked the researcher to improve his slow work pace and help him with his language difficulty.

The researcher then proceeds to conduct observation to confirm teacher's statement. The observation took place during Bahasa Indonesia lesson. Teacher assigns Rudi to read a passage, four short paragraph consists of 2-3 sentences. Then teacher proceed to attend another child. When left to read on his own Rudi can read relatively well. After he finished reading the passage teacher then say *“Are you finished? Good. Now work on assignment 1 based on the passage you've just read.”* The assignment consists of 5 questions related to the passage. Rudi then proceeds to open his assignment book and start working on it writing dates and assignment title on his book. After finished reading the first question he then starts to write some answers. He then proceeds to the next question. In this question his expression changed to a slight frown. He then starts to flip his textbook pages one by one. He stopped at some point and say *“saya pusing/I'm having headache”* and places his forehead on his book. He starts doodling on his book shortly after. The teacher then asked, *“Why are you not working on your assignment?”* to which Rudi respond, *“I'm having headache, I don't understand the question”*. The teacher then starts to help him by telling him the meaning of words he does not know, then paraphrasing the question in simple sentence, and give hint about the answer. He was then able to figure out the answer and proceeds to working on the

next question. He can't understand three out of five questions. By the time he finished working with this assignment, time has passed 25 minutes and the time for Bahasa Indonesia lesson has run out, meanwhile his peer was able to work on two assignments. In the time of the assessment, he was already one chapter behind his peers. Results from initial class observation support teacher's description of Rudi's difficulty.

Functional analysis of behavior was used to summarize the intake interview:

Distant Past

- Rudi moves a lot from school to school following his father's work
- Prior to attending the current school, He never receives any education in Indonesian or attending school that follows Indonesian educational system

Antecedent

- Rudi struggles to comprehend some Indonesian words
- He cannot work independently and mostly relies on help given by teacher to finish it

Behavior

- Difficulty in comprehending formal Indonesian language used in the task instruction
- Slow-paced working, in some occasion he just gave up saying "I cannot do this task"

Consequences

- Teacher mostly helps him to finish the task, parents sometimes did his homework
- He finished the task way later than his peer. When he gave up, resulting work is not satisfactory

Future/Hope

- To work on a faster pace
- Able to comprehend instructions given in the task

Figure 1. Functional analysis of behavior

Based on the data obtained from intake and observation the researcher hypothesized that his difficulty in Indonesian language appears at random, as he does not exhibit any general or specific pattern of difficulty, due to incomplete repository of Indonesian vocabulary. Given that he can understand two questions out of five and are able to provide a correct answer. His sole problem is that he does not know the meaning of one or two word in a sentence and it renders him clueless about the meaning of the sentence as a whole and this is what slows down his working pace.

Behavior modification is a long used to address behavioral excesses and deficits as it focuses on applying learning principles and techniques on improving one's covert and overt behavior (Martin & Pear, 2015). Therefore, behavior modification is a good fit for Rudi's case as Rudi's presenting problems all points to behavioural excess (disturbing, complaining), and deficits (unable to understand words, slow work pace, and unable to work independently). Further, language acquisition and reading has long been argued as explainable through the mechanism of operant conditioning (Raygor, Mark, & Warren, 1966; Skinner, 1957) and is therefore modify-able through behavior modification (Kupzyk, Daly, & Andersen, 2011; Domjan, 2012; Sturdy & Nicolandis, 2017)

Previous intervention employing varieties of behavior modification technique showed promising result in improving participants' reading skills and ability (Ooko & Aloka, 2021), vocabulary (Putri, Rusli, & Safitri, 2019) and attention (Whalen & Schreibman, 2003). In Rudi's case the aim of the modification should be to increase vocabulary and language comprehension with aim to reduce time spent working on assignment and improving his grade.

Method

Participants

The participant of this study was Rudi (Pseudonym), Indonesian boy aged 8 years 6 month 12 days attending 3rd grade of elementary school. Rudi was referred for intervention because teacher complained Rudi has difficulties in comprehending Indonesian language (Bahasa Indonesia) and it affects his school performance. Initial observation both during class and outside class showed that Rudi's problem isolated in difficulty in comprehending formal form of Bahasa Indonesia used in textbooks and class instruction. He showed no noticeable difficulties in holding conversation with non-formal form of Bahasa Indonesia.

Research Design

This research uses single-subject experimental design with baseline measurement that will serve as pre-test and follow-up measurement as post-test. The intervention was conducted in total of 21 session with, 15 main treatment session, 3 session in the beginning of the treatment for baseline measurement and 3 sessions in the end of the treatment for follow-up measurement. Each session lasts 45 to 60 minutes for four weeks. Consent for research and intervention was obtained from both parents and homeroom teacher.

Instruments

The researcher records time spent on assignment and grade as indicators of success in intervention. The researcher records time using digital stopwatch beginning from when Rudi starts to read his assignment and stopped when Rudi said he is done with the assignment. The participants records grading as it was given from his teacher.

Procedure

Given the random nature of the language difficulty the researcher decided to measure it using his total work duration on individual assignment. The researcher decided to measure the duration because it is the area, which is clearly impacted by his language difficulty, as also stated by the teacher, and can be recorded in numbers to provide quantitative evidence of his performance. The behavior was recorded using whole duration recording method of time sampling. The researcher will press start on digital stopwatch when teacher finished giving her instruction and press stop when Rudi finished writing his answer for last question. The researcher will write down time shown by the digital stopwatch in [mm:ss] format. The researcher also recorded teacher's grade on Rudi's work as an additional measurement to reflect the quality of his work. The researcher wrote down the grades given by teacher for Rudi's assignment ranging from 0 – 100, 0 is the lowest score and 100 is the the highest score for an assignment is 100.

To determine the goal of the treatment we begin with baseline measurement. The measurement took place in the first three session. During baseline measurement, the researcher stand in the back of the class behind Rudi. From this position the researcher can clearly see what he is doing without interfering him. During baseline measurement the researcher tried to limit presence in class so that Rudi may perform in his usual performance without the feeling of being watched. The first baseline was conducted during *Pendidikan Kewarganegaraan (PKn)* lesson. Rudi was asked to read a passage from the textbook and asked to answer 5 question related to the passage. He finished working at 27 minutes 05 seconds and scored 75. The second baseline session took place during *Bahasa Indonesia* lesson. During this lesson, Rudi was asked to read a passage 5 short-paragraph long and asked to make a summary of the passage. Rudi finished in 32 minutes 14 seconds, way past the allotted time

for *Bahasa Indonesia* lesson, with score of 60. Reading his summary, he clearly doesn't know how to summarize a paragraph or to determine the main idea of a paragraph. He's literally copying most of the reading passage. The third baseline session also took place during *Bahasa Indonesia* lesson. This time Rudi was asked to write a story about his vacation. Rudi only wrote down several sentences describing places he visited and did not elaborate further.

From the data we formulate the following goal of this treatment: to reduce his working duration to 20 minutes and maintain above 70 marks on his assignment. This goal was formulated based two data: first is his working duration average of 29 minutes and 19 seconds recorded during baseline measurement, and second is his peers' average working time of 15 minutes. The goal to maintain above 70 marks is based on minimum grade (passing grade) determined by the curriculum. This goal is less demanding for the children because 20 minutes goal gives Rudi 5 minutes extra working time to understand the question and formulate appropriate answer compared with his peers, yet still shows 9 minutes faster work duration from his usual working time.

The treatment procedure began in the fourth session. The treatment follows duration shaping procedure as Rudi's work pace is very slow and bearing an unsatisfactory result. Shaping was defined by Martin & Pear (2015) as "*the development of a new operant behavior by the reinforcement of successive approximations of that behavior and the extinction of earlier approximations of that behavior until the new behavior occurs.*" In Rudi's case, shaping was intended to decrease the total amount of time spent on doing his assignment. To promote faster working pace we aided Rudi with decreasing assistance along the course of the treatment. We begin our assistance with maximum help by guiding Rudi's work on assignment paraphrasing the question and providing hints on how to answer the question and gradually decreasing the amount of help as the training progress. Positive reinforcement was given if Rudi can meet the target for the current session. Positive reinforcement will be given in form of stickers and praise. The sticker system has already been implemented by the homeroom teacher as a reward for outstanding performance eg. finishing a task in a short time and get a good grade. Sticker and praise will be given in combination if Rudi fulfils all of session target, whereas only praise will be given if Rudi only fulfil one session target. Rewards was not given when Rudi did not meet any of the target for the current session. Praise was given with one of the following phrase "good job", "good", "well done", or "you're doing great!"

Result and Discussion

Result

In the first treatment session, Rudi was assigned to read a passage and answering questions based on the reading. The researcher begin the treatment with explaining today's target. In this session the researcher set the target of 25 minutes and minimum passing grade (70). The researcher sit next to Rudi and watching his progress with the work. When Rudi started to say "*aku nggak tahu/ I don't know about this*" or "*aku bingung/I'm confused*", the researcher started to guide him by explaining the question to add his Indonesian word repertoire, then help him to find the answer by asking him to read the passage with me and give a hint when we arrive at the sentence that is the answer. When we arrive at the sentence the researcher will say "*coba di kalimat ini ada nggak jawabannya?/Now, can you find the answer for the question in this sentence?*". He then mention the answer and the researcher give a nod as a sign of approval, he then wrote it in his book. The same procedure was repeated once when he cannot find answer for another question. He's finished in 22 minutes and 21 seconds scoring 90. He then receives praise from the researcher and a sticker in his sticker book from the teacher. He's very happy with it shown with big proud smile in his face. The

researcher continued the same procedure for the next two session and reducing the target time from 25 to 20 and gradually adding the minimum grade up to 85. The target time stays the same throughout the treatment. Where he can always fulfil his target (refer to the table 1 in the end of this section).

In the fourth session (time: 19:32 | grade: 85), Rudi starts to doodle in the beginning of the assignment. He does not start to work immediately after the teacher finished her instruction. The researcher prompt him to start working and he still did not start working. The assignment was a fairly easy one, putting exclamation mark on appropriate sentence. The researcher prompt him again to stop the behavior by saying “*Rudi, ayo tugasnya dikerjain*/Rudi, please work on your assignment” using low tone and look him directly on his eye. Rudi then follows my instruction and start working on his assignment. He still receives the same reward as the previous 3 session. In light of the fourth session the researcher added another term on his reward, the sticker reward will be given if he does not doodle or playing with his stationeries during assignment. Starting in the fifth session, the researcher start to withheld maximum help and ask him to model my behavior instead of guiding him. When he was not able to answer the researcher will open a book and reads the passage. Then the researcher will points out “the answer is here in the passage”. Then ask him to do it by himself. The researcher also only gives him the meaning of the words he did not understand instead of paraphrasing the sentence for him. In the fifth (time: 16:55 | grade: 80), sixth (time: 16:13 | grade: 80) and seventh (time: 18:07 | grade: 80) session he does not receives any stickers due to doodling and did not meet the grade criteria respectively.

Starting the eighth session (time: 13:44 | grade: 100) the researcher starts only to instruct him instead of asking him to model me when he faces difficulty. The researcher instructs him to “look for the answer in your book. You can always find the answer if you looked up in your book.” In this session he performs really well and receives good job praise and sticker. In the ninth session, teacher assign Rudi to make a summary of 5-short paragraph reading passage. For this session, the researcher immediately relapse into guiding him because making a summary is a whole different task from the previous tasks as it requires good understanding of *Bahasa Indonesia*. The researcher guide Rudi on how to find and determine important information from a paragraph, filtering out less important information, and how to paraphrase them and making it into concise summary. The researcher also gave praise when he can determine the important information of a paragraph and making a good summary of it. For this task Rudi finish at 24 minutes 54 seconds with 100 grades. Given this result the researcher gave him a praise with high five and a sticker. Even though his time is way past the target, but it has a noticeable 7 minutes and 20 second and 40 point time-grade difference from the previous summary assignment.

In the tenth session (time: 17:05 | grade: 80) the researcher return back to only providing instructions instead of guide or model. The researcher also starts to give a differential reinforcement of incompatible responding (DRI) to reduce the amount of off-task behavior such as doodling and playing with his stationeries. The incompatible response is “looking up the answer in the book/passage”. The following eleventh (time: 18:15 | grade: 90) and twelfth (time: 16:46 | grade: 80) session follows the same procedure as the tenth session.

Starting from the thirteenth session the researcher withheld any form of assistance. The researcher just sit in the back and watch him working. But the researcher was still giving him DRI reinforcement to reduce his doodling behavior. In the thirteenth session he does well (time: 17:12 | grade: 80). However, in the fourteenth session he’s not performing well, he feels confused and starts doodling instead of working. Then the researcher start to give him instructions. He can follow the instruction well and finish the task (time: 17:44 | grade:

100). The researcher did not give any rewards during this session. In the fifteenth session, last session, he can work independently (time: 16:19 | grade: 85) despite a bit off-task behavior. The researcher decided to stop on fifteenth session because he's able to perform faster than target behavior for several consecutive time.

Table 1.
Summary of the Treatment Process

| Session | Grades | Duration | Target | | | Reward | |
|---------|--------|----------|--------|-------|----------|--------|---------|
| | | | Time | Grade | Doodling | Praise | Sticker |
| 1 | 90 | 22:21 | 20:00 | 75 | N/M | √ | √ |
| 2 | 100 | 17:26 | 20:00 | 75 | N/M | √ | √ |
| 3 | 100 | 13:43 | 20:00 | 75 | N/M | √ | √ |
| 4 | 85 | 19:32 | 20:00 | 75 | Yes | √ | |
| 5 | 80 | 16:55 | 20:00 | 75 | Yes | √ | |
| 6 | 80 | 16:13 | 20:00 | 80 | Yes | √ | |
| 7 | 80 | 18:07 | 20:00 | 80 | No | √ | |
| 8 | 100 | 13:44 | 20:00 | 80 | Yes | √ | |
| 9 | 100 | 24:54 | 20:00 | 80 | No | √ | √ |
| 10 | 80 | 17:05 | 20:00 | 80 | No | √ | |
| 11 | 90 | 18:15 | 20:00 | 80 | Yes | √ | |
| 12 | 80 | 16:46 | 20:00 | 85 | Yes | √ | |
| 13 | 80 | 17:12 | 20:00 | 85 | No | √ | |
| 14 | 100 | 17:44 | 20:00 | 85 | Yes | | |
| 15 | 85 | 16:19 | 20:00 | 85 | Yes | √ | |

The researcher proceed to evaluating the efficacy of the treatment by conducting a follow up session. In the follow session, the researcher sat in the same place for baseline measurement and watch Rudi from behind. The progress of the treatment is presented in the following graph. Session 1 until 3 are the baseline measurement, session 4 until 18 are the treatment sessions, and session 19 until 21 are the follow-up session.

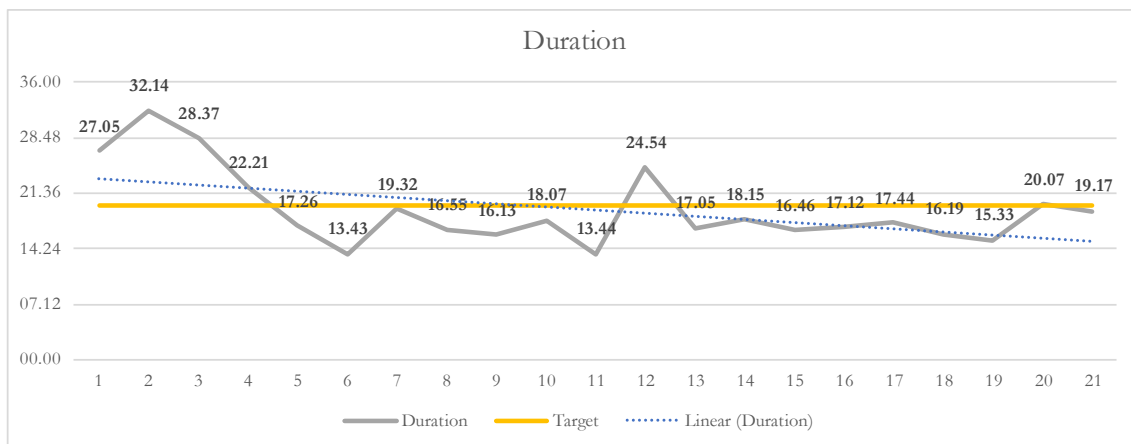


Figure 1. Duration recording

From both graph we can see that Rudi benefitted from this treatment. His working duration average was decreased from 29 minutes and 19 seconds in the baseline measurement to 17 minutes and 45 minutes in the treatment phase. During follow-up, his average working time shows 18 minutes and 19 seconds' average. Trendline showed a downward slope throughout all session.

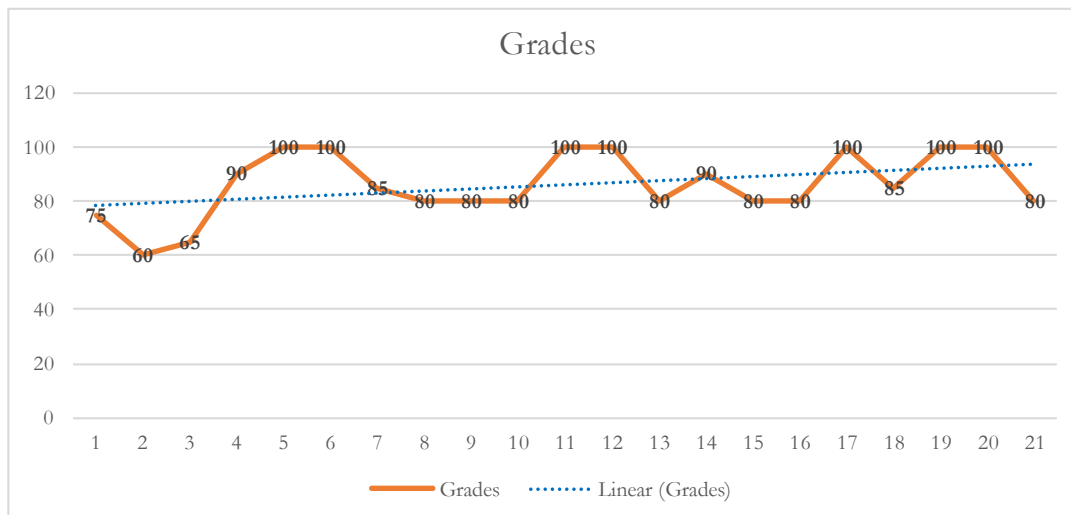


Figure 2. Grade records

His grades also improved, as an upward trendline was shown in figure 3. We are unable to evaluate his ability on summarizing because there is no summary task in the current chapter during follow-up measurement.

Discussion

Based on the course of treatment, both of main intervention hypotheses was held true. He is indeed facing difficulty in commanding formal *Bahasa Indonesia* and it slows down his performance. The slow performance also exacerbated by his off-task behavior e.g. doodling and playing with his stationeries. Both creates a vicious circle, he's feeling confused and unable to find the answer because he doodles instead of looking for the answer, that slows his performance.

Evaluating the course of the treatment, the researcher find Rudi can benefit from shaping with decreasing assistance method. He can perform well within the target and receives a good grade for it. It can be explained with the nature of Rudi's difficulty. Rudi already has a relatively good *Bahasa Indonesia* vocabulary repertoire in his mind. His language difficulty is scattered in random. All he need is someone to tell him the meaning of the words. Although, DRI seems doesn't work that well in Rudi's off-task behavior. He still produces doodling behavior even until the end of the treatment. While it is true that learning is a dynamic process with various confounding variables from both internal and external sources can appear from time to time, this research agrees that operant conditioning still plays a part in children's language learning as argued by Sturdy and Nicolandis (2017).

Reflecting from the progress and dynamics during treatment phase, the researcher suggests a reading intervention for Rudi to improve his *Bahasa Indonesia* vocabulary repertoire. Reading a Indonesian children story book (not comic book), can help Rudi to improve his vocabulary repertoire as well as familiarizing him with formal form of *Bahasa Indonesia*. The resarcher also suggest that Rudi's off-task behavior should became primary focus for the teacher or the next behavior training. We find that language difficulty and off-task behavior

together form a vicious circle that prolong his working duration. We did not focus on this behavior because it doesn't show as a main problem during intake and prior observation. This behavior came into light when the researcher start working intensively with him.

Conclusion

The intervention strategy was able to help Rudi with his difficulties in class through the employment of shaping technique with decreasing assistance and differential reinforcement of incompatible responding to alleviate emerging problem that was previously unidentified. Further intervention for off-task behavior is recommended.

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