

## Contingency Contracting and Its Impact on the Use of Punctuation Skills by Fifth Graders With Learning Disabilities

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*The purpose of this study was to assess the effectiveness of contingency contracting on the percentage of correctly used punctuation marks in free writing tasks. Participants were three 11-year-old boys with learning disabilities (LD). A multiple-baseline across-subjects design was employed to test our prediction that the students would show significant improvements once the agreement went into effect. Overall outcomes indicated that the approach was very successful. The results are discussed in the context of the study limitations. Implications for future research are provided.*

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**Keywords:** Writing Mechanics, Punctuation Skills, Learning Disabilities, Contingency Contracting, Single-Case Study

### INTRODUCTION

“Reading determines how students see the world, while writing determines how the world sees them” (Atlee, 2005, p. 4). Text products are powerful tools for demonstrating knowledge, and are common means of assessing the competence level of learners in school (Santangelo, 2014). However, qualified composition requires previous mastery of writing mechanics, such as grammar, sentence structure, spelling, and punctuation (Fayol, 2015). If students struggle with the corresponding skills, they are less able to invest sufficient cognitive resources in executing the higher-order processes at the center of the famous model by Hayes and Flower (1980): planning, translating, and revising (Alamargot, Caporossi, Chesnet, & Ros, 2011). Children and youth with learning disabilities (LD) are especially at risk for falling behind in this area (Graham, Collins, & Rigby-Wills, 2017).

If students have not yet acquired these prerequisite skills to a satisfactory level, they need to be taught through explicit and systematic instruction as well as incidental or natural learning approaches (Graham, 1999; McLaughlin, Weber, & Derby, 2014; Williams, Walker, Vaughn, & Wanzek, 2017). On the other hand, if they are already familiar with the aforementioned writing mechanics, but fail to adequately adhere to them when producing a text, they need

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an aid to remind and motivate them to use them, as appropriate.

Various operant learning principles have proven to be very helpful in this respect (Forness, Kavale, Blum, & Lloyd, 1997); that is, learning in which the probability of a response is altered by a change in consequences (Skinner, 2014). One well-known and effective application of operant conditioning in the classroom is contingency contracting (Homme, 1970). When using this tool, two or more persons (e.g., a teacher and a student) compose and sign a written agreement, stating specific consequences for specific behaviors (Miller & Kelley, 1994). If learners need to improve their written mechanics, for example, such an agreement might state that they will receive a certain number of minutes of play time at the computer if they reach a specific benchmark (like correctly spelling 8 out of 10 one-syllable words from a Dolch list).

In his literature review, Murphey (1988) identified contingency contracting as an effective tool for boosting academic productivity and performance accuracy. However, this approach seems to have gone out of fashion in the scholarly literature in recent years. A search in PsycInfo, ERIC, and Medline for the period 1968–2017 yielded 174 publications that included the term *contingency contract* or *contingency contracting* in their titles (as of November 2017), the great majority of them focusing on the application of this method in the classroom. Most of these studies ( $N = 123$ ) appeared between 1968 and 1988, with only 12 hits for the past 10 years. Thus, the latest journal article on contingency contracting in a school setting dates back to 2007 (Mruzek, Cohen, & Smith, 2007).

In the present study, we focused on an aspect of writing mechanics that has received relatively little attention in the special education literature: punctuation (defined as marks – such as periods, commas, question marks, or parentheses – used to separate sentences and their elements and to clarify meaning). Without proper punctuation, the message of a text may be difficult to understand or downright misleading. For example, there is a great difference between “Let’s eat, Grandma” vs. “Let’s eat Grandma.” Or: “I love cooking, my dogs, and my family” vs. “I love cooking my dogs and my family.”

In a recent experiment with more than 800 Australian elementary school students, Daffern, Mackenzie, and Hemmings (2017) identified spelling, grammar, and punctuation as joint predictors of the quality of compositional writing in later grades. Of these language convention skills, punctuation seems to be the least complex and the easiest to automatize. Thus, it makes sense to help students who have trouble concentrating on writing mechanics during text composition develop fluency in punctuation in order to quickly boost their self-confidence and reduce cognitive load (Samson, 2014).

To our knowledge, there has only been one publication to date that addresses the effects of written agreements between teachers and students on the

motivation of struggling learners to concentrate on applying correct punctuation during writing tasks. In this study, Newstrom, McLaughlin, and Sweeney (1999) analyzed the implications of a contingency contract on the capitalization and punctuation skills of a ninth grader with behavior problems. The results indicated that the intervention was remarkably successful.

Given that the existing literature on contingency contracting in school settings is dated and that only one published study has focused on its impact on writing mechanics, we conducted a trial aimed at shedding further light on this issue. Specifically, we examined whether a written agreement would increase the use of correct punctuation marks in three fifth graders with LD.

## METHOD

### *Participants and Setting*

Three boys (all 11 years old) participated in the study: Nico, Selatin, and Gabriel (names changed to ensure anonymity). All students attended the same fifth-grade class in an inclusive secondary school in the greater metropolitan area of Cologne, Germany. Selatin's parents are of Turkish nationality. Gabriel moved to Germany from Romania when he was 6 years old. Nico, however, was a native German. The boys had all been diagnosed with LD by a multidisciplinary team and were receiving special education services as part of an individualized education plan. According to their classroom teacher, they demonstrated severe concentration problems. Whereas they spoke German fluently, their spelling skills were below average. Even though they usually committed a significant number of punctuation errors in free writing tasks, they knew the basic punctuation rules in the German language and were able to explain them when asked to do so.

### *Measurement*

The dependent variable for the study was obtained through writing samples collected with randomly chosen story starters for third graders, taken from [www.scholastic.com/teachers/story-starters/](http://www.scholastic.com/teachers/story-starters/). (The same prompt was never presented twice.) The students were handed an 8x12" sheet of paper. During each measurement, a female research assistant with an academic background in German linguistics asked them to write their respective story into a 6x10" box containing 15 lines that was printed on the paper. If they ran out of space before they had finished their text, students were given an opportunity to finish it on the back of the sheet. The research assistant encouraged the participants to use the whole box for their texts and write on every line. No time limits were imposed for finishing the assignment. All measurements occurred in the participants' classroom while the rest of the class was engaged in silent table work.

After collecting the texts, the research assistant counted the total number of words written in the box and determined the percentage of correct punc-

tuations (in accordance with Wilde, 1986). To enhance reliability, she analyzed the texts at least one more time a day later. In the rare case of a discrepancy in the number of words written or in the ratio of proper punctuations, she conducted a third count. A fourth count was never necessary.

**Experimental Design and Procedure**

A multiple-baseline-across-participants design (A-B-A withdrawal) (Kazdin, 2010) was used, consisting of the following: establishing a baseline condition (A<sub>1</sub> Phase) for each student, introducing a treatment to elicit an increase in performance (B Phase), and then removing the treatment to determine if the ratio of correct punctuation returned to the baseline (A<sub>2</sub> Phase) (Barlow, Nock, Andrasik, & Hersen, 2008). All assessment and intervention sessions occurred over a 3-week period with 14 measuring points. The beginning and end of the treatment was determined randomly for each case within the constraint that a phase had to consist of at least three probes. Figure 1 depicts the number of measurement points during baseline, intervention, and return to the baseline for Nico, Selatin, and Gabriel.

**Figure 1. Study design and duration of the intervention for the three participants.**

Name	Session/Phase													
Nico	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Selatin	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Gabriel	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	A <sub>1</sub> Phase				B Phase					A <sub>2</sub> Phase				

Phase A<sub>1</sub> consisted of having the participants write a story under conditions described above. No instruction was given during this time. Each student worked on his assignment individually. After the last baseline measurement, the research assistant sat down with each child individually for about 15 minutes to remind them of the punctuation rules in German (which are largely the same as in English). Subsequently, she showed them a graph of the percentage of correct punctuation marks they had used in their writing tasks during the baseline conditions and offered them a contingency contract based on an “if-then” arrangement: Each time the student outperformed the highest score he had achieved prior to the agreement, he earned a piece of candy of his choice from a candy box. After the children agreed to the terms, the contracts were typed up and signed by both parties – the student and the research assistant.

After each writing probe during Phase B, the participants watched the research assistant check their stories for proper punctuation. During Phases A<sub>1</sub> and A<sub>2</sub>, the initial scoring was done without the children present. But in Phase B, they were given the opportunity to sit next to the research assistant while she calculated the ratio of standard punctuation marks and signs that they had accurately used in their stories. The students eagerly awaited the results and were happy to receive their reward when scoring above their highest baseline result. After Phase B ended, no more feedback was given, and no sweets could be earned (just as during Phase A<sub>1</sub>).

### RESULTS AND DISCUSSION

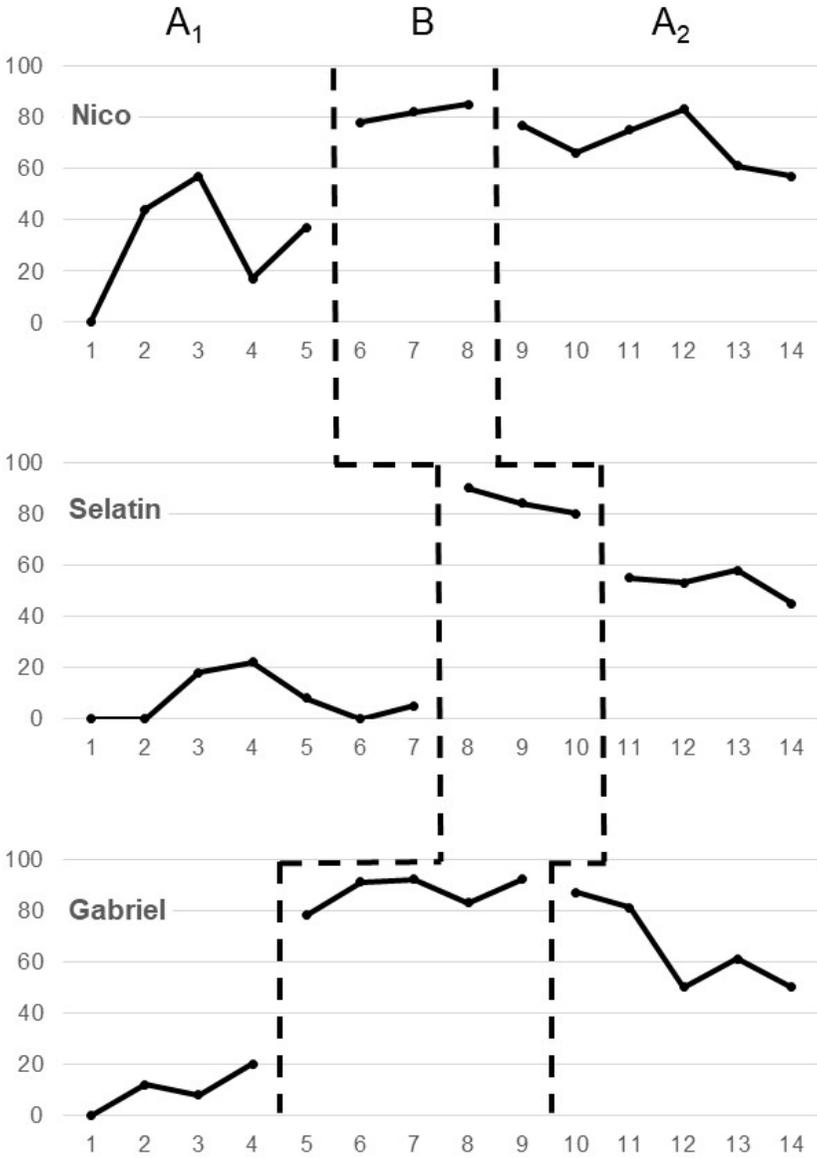
The number of words written in the box during the writing tasks varied between 44 and 111 for Nico ( $M = 84.62$ ;  $SD = 22.10$ ), between 44 and 74 for Selatin ( $M = 64.15$ ;  $SD = 8.32$ ), and between 58 and 112 for Gabriel ( $M = 73.54$ ;  $SD = 15.07$ ). Table 1 shows the percentage of correct punctuation marks (rounded) and the percentage of non-overlapping data (PND; Scruggs, Mastropieri, & Casto, 1987) for A<sub>1</sub> vs. B and B vs. A<sub>2</sub> for each student.

**Table 1. Overview of Study Results per Phase**

Student		Phase A <sub>1</sub>	Phase B	Phase A <sub>2</sub>
Nico	<i>N</i> (Probes)	5	3	6
	Scores	0; 44; 57; 17; 34	78; 82; 85	77; 66; 75; 83; 61; 57
	PND	-/-	100	83.33
Selatin	<i>N</i> (Probes)	7	3	4
	Scores	0; 0; 18; 22; 8; 0; 5	90; 84; 80	55; 53; 58; 45
	PND	-/-	100	100
Gabriel	<i>N</i> (Probes)	4	5	5
	Scores	0; 12; 8; 20	78; 91; 92; 83; 92	87; 81; 50; 61; 50
	PND	-/-	100	60.00

Correlations (Spearman) between the number of words written and the ratio of correct punctuation marks were low ( $r = -0.29$  to  $0.30$ ) and failed to reach statistical significance. It is interesting to note that all three participants started out using no proper punctuation marks in their stories. Figure 2 illustrates the trajectory of the data.

**Figure 2. Percentage of correct punctuation across all three phases.**



As the graph suggests, the performance of all three students increased as soon as the contract went into effect. The percentage of data in Phase B that exceeded the highest measurement from Phase A<sub>1</sub> was 100 for each participant. However, performance dropped as soon as the research assistant stopped rewarding the students for high ratios of correctly used punctuation marks. The percentage of data in Phase A<sub>2</sub> below the lowest measurement in Phase B was 83.33 for Nico, 100 for Selatin, and 60.00 for Gabriel. Because, not surprisingly, the students' performance rose and fell depending on whether the contract was in effect or not, we applied a randomization test to ascertain whether the phase differences deviated significantly from zero (Edgington & Onghena, 2007). With the help of a Microsoft® Excel macro for A-B-A multiple-baseline designs (downloadable from <https://www.routledge.com/products/9780415886932>), we determined that this was not the case. The differences between the phases were statistically significant with a *p* value of  $< .001$ .

Therefore, our findings clearly indicate the potential of an extremely simple contingency contracting intervention for helping to improve the punctuation performance of students who have trouble concentrating on writing mechanics while composing a text. It has to be assumed that it was not the reward itself that made the difference, but the fact that someone took an interest in how well the participants did. And as a result, they focused more on their academic achievement than without an effective agreement. As has been shown before (e.g., Allen, Howard, Sweeney, & McLaughlin, 1993; Miller & Kelley, 1994; Murphey, 1988), contingency contracting can be a very powerful tool for motivating struggling learners to apply a skill or knowledge that they already possess but otherwise fail to use.

While our study showed positive results for all three participants, there were also some limitations. The first pertains to the low number of subjects – a key point of criticism for basically all single-case analyses. Thus, findings from experiments involving few subjects may only be generalized with great caution. In the present case, additional research that includes students with LD is warranted to provide further evidence of the potential of contingency contracting with this population.

Another limitation relates to the fact that all participants showed only a momentary motivational increase that declined as soon as the research assistant stopped rewarding them for their performance. However, teachers need tools that enhance their students' correct use of punctuation marks on a more stable basis. An intervention that meets this requirement might have to be designed differently. We assume that retention of the agreement would continue to lead to increased motivation to pay attention to correct punctuations, but it is also possible that the rewards will lose their value over time. Thus, more research is

required to provide answers to the question of how to encourage students with LD to continuously pay attention to correct use of punctuation.

A final limitation concerns the reliability of the performance data. While the research assistant verified the counting process, as noted above, there was no further corrective. She had an academic background in German linguistics. Presumably, she knew how to correctly use commas, periods, question marks, parentheses, exclamation points, and so on. However, it would have been better to provide an additional assistant to double-check the results. To that effect, future research should use external correctives to ensure reliability.

Despite these limitations, our study generated some promising results. Especially in inclusive settings, teachers need to be able to apply individualized methods that can be implemented without much effort. Even though contingency contracting seems to have gone out of style in recent years, this tool carries the potential for helping struggling learners to gradually develop automaticity in different academic skills. Most students with LD demonstrate severe deficits in working memory and concentration (Maehler & Schuchardt, 2016). Therefore, it is necessary to automatize the targeted skills before attending to the next educational objective to prevent cognitive overload (Prater, 2018; Sternberg & Wagner, 1982; Vaughn & Bos, 2015).

Future research should focus on shedding more light on how to effectively apply approaches like contingency contracting in inclusive classrooms in a way that facilitates this process with academically challenged children and youth in the long term. Students with LD and other special needs have to be able to eventually tackle higher-order learning tasks like comprehending a sophisticated text, solve a complex word problem, or composing a decent essay. Given that text production skills are vital for success in school, careers, and life in general, but far too often get pushed to the dusty corners of the classroom, it seems especially urgent to use tools like contingency contracting in the context of writing mechanics like punctuation (Graham, MacArthur, & Fitzgerald, 2013).

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