The Effects of Contingency Contracts on the Correct Use of Punctuation Marks in Elementary Students With Learning Disabilities

Matthias Grünke
University of Cologne, Germany

The purpose of this study was to evaluate the effectiveness of a simple contingency contracting intervention on the correct use of punctuation marks in freely produced texts by elementary school children with learning disabilities. This approach can be considered a promising strategy for facilitating the development of academic skills in struggling students. The benefits of contingency contracting were evaluated using an ABC multiple baseline design across three subjects. Results indicated that this technique was very helpful in distinctly boosting the performance of the participants. Applying contingency contracts requires little effort on the part of teachers and can be viewed as a very serviceable tool to support struggling students in their endeavors to produce stories with proper punctuation.

Keywords: **contingency contracts, token economy, writing mechanics, punctuation, learning disabilities, single-case research**

Introduction

The meaning of spoken language gets conveyed not only through words but also through nonverbal modes of communication such as intonation, gestures, and facial expressions. These ways of clarifying what one wants to get across are missing when interacting through written language. Punctuation is an attempt to make up for this. It involves the use of marks (commas, periods, dashes, colons, interrogation points, etc.) to clarify the meaning for the reader (Borochovsky Bar-Aba, 2003). For example, there is a big difference in writing "Your donation helped someone get a job!" as opposed to "Your donation helped someone, get a job!" Likewise, the meaning of "Most of the time, travelers worry about their luggage" is a very different one than "Most of the time travelers worry about their luggage." Thus, it is vital for elementary students to learn how to use punctuations accurately. Being able to properly write words using the correct order of letters and to demonstrate sufficient text composition skills is not enough. Children must also become proficient in exerting the rules that regulate a sentence's structure.

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Most girls and boys master this hurdle by the end of their elementary education. However, a considerable share of them do not. According to Katusic, Colligan, Weaver, and Barbaresi (2009), the prevalence of students meeting the criteria for a written language disability varies between 6.9% and 14.7%. These learners demonstrate problems not only with putting their thoughts on paper but also with the mechanics of writing such as spelling, grammar, and punctuation (Cicci, 1980).

Text production is an extremely complex endeavor that involves both creating and organizing ideas as well as translating them into written form while complying with conventional language rules. This might easily lead to a cognitive overload on the working memory. If students do not learn to apply the basic mechanics of writing with relatively little effort, they will not have the necessary mental resources available to focus on the content (Santangelo, 2014).

Because the working memory must simultaneously tend to such a large number of processes during text production, it is oftentimes challenging for a lot of students to apply punctuation conventions, even though they are familiar with them. They might be fully capable of applying punctuation correctly, yet they unintentionally ignore it because of the many other things to which they need to pay attention. Hence, it is important to help them develop more automaticity in utilizing the respective rules. If learners are proficient in correctly applying punctuation symbols, they can thereby reduce their working memory overload and have more cognitive resources at their disposal to concentrate on coherence, cohesion, and other text quality indicators.

The most common tool in special education to enhance the motivation of children and adolescents in the classroom is the token economy (Prater, 2018). With this technique, students earn tokens (e.g., paper-clips, marbles, or coins) for performing well or showing certain behaviors, and later, the tokens can be traded for back-up reinforcers (e.g., stickers, chewing gum, cookies, or surprise eggs; Kazdin, 2000; McLaughlin & Williams, 1988). Meta-analyses on the effectiveness of token economies yield very positive overall findings across a large variety of different student behaviors (e.g., Couch, 2019; Maggin, Chafouleas, Goddard, & Johnson, 2011; Soares, Harrison, Vannest, & McClelland, 2016).

One promising way to boost the efficacy of this method is contingency contracting, which involves a written document indicating the contingencies for rewards in the form of if-by-then statements (if a certain target behavior is demonstrated by a certain extent or a certain time, then a token is given; Prater, 2018). A particular feature of contingency contracting is the fact that the agreement is negotiated and signed by all parties involved (usually a student and a teacher). Even though this approach is widely applied, a comprehensive search of relevant databases (PsycINFO, ERIC, SCOPUS, Academic Search Premier,

and TOC Premier) yielded only two hits that included "contingency contract" or "contingency contracting" and "punctuation" in their abstracts.

In the first article, Newstrom, McLaughlin, and Sweeney (1999) presented a single-case analysis of one middle-school boy with behavioral problems and difficulty with punctuation and capitalization. The approach was obviously very effective in increasing the student's proper use of writing mechanics. In the second paper, Grünke and Coeppicus (2017) outlined a single-case experiment involving three 11-year-old boys with learning disabilities. Again, the intervention led to significant improvements in the usage of correct punctuation.

The thrust of this study was to extend the very slim line of research on the effectiveness of contingency contracting on basic writing mechanics—in this case on correctly used punctuation marks in free writing tasks. It was anticipated that a stark improvement in performance would occur as soon as the agreement went into effect and would keep student achievement on a high level even after the intervention terminated.

Method

The study took place in an inclusive elementary school in a major metropolitan city in Germany. The main teacher of a third grade class asked me for help with improving the mechanics of writing in some of her students struggling with text production. We selected three children whose punctuation skills were far below average (as measured by a standardized language test) but who appeared motivated to work with us. All of them had been diagnosed with a learning disability by a healthcare or school professional.

Anja (female) was 9 years old at the time of the study and was born in Germany to parents from Serbia. The lingua franca in her home was Serbian. Her teacher described her as quiet and reserved. She had considerable problems with math, but also with punctuations. Nine-year old Ben (male) was born in Iran. His parents were natives of Afghanistan and spoke Persian with him at home. Ben's teacher characterized him as eager to learn but slow to catch on. Most of the time, he needed additional help when engaging in classroom activities. His overall performance was below average. Christine (female) was 8 years old when she participated in this research. She was born in Armenia and spoke Armenian with her family at home. According to her teacher, Christine was extraordinarily shy and tended to daydream a lot. Her grades were in the C and D range.

I applied an ABC multiple baseline design across subjects to detect whether a functional relationship existed between intervention and outcome (Horner et al., 2005). It included a preassessment phase (A), a treatment phase (B), and a maintenance phase (C). I predetermined that the contingency contracting would always be implemented for exactly four days. However, the du-

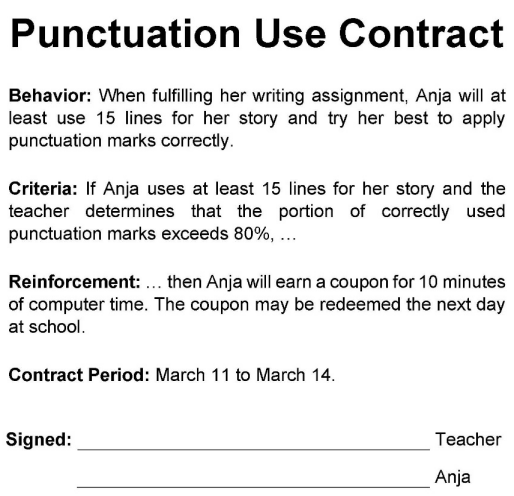
ration of the A and the C phases varied between three and five measurement points. The whole study spread over 12 probes. To enhance the internal validity of the experiment, I allocated Anja, Ben, and Christine to one of the three constellations by chance.

On 12 consecutive school days, a female graduate student in special education took one child at a time from his or her classroom to a resource room. She asked him or her to sit down at a table and handed him or her a DIN-A-4 sized paper on which was a 6x10" box containing 15 lines. The participants were then asked to produce a story in response to a randomly chosen writing prompt from www.journalbuddies.com/prompts-by-grade/3rd-grade-writing-prompts. Children were required to compose a text at least long enough to fill all the lines in the box. The percentage of correctly used punctuation marks in a story served as dependent variable. This ratio was calculated on the basis of all positions where a punctuation mark should have been put in a respective text and the number of errors of commission and omission. Whereas all texts were scored by the aforementioned graduate student, a random 50% of them were independently rated by a male research assistant to determine the interrater reliability. The agreement between both individuals reached 96% (any discrepancies were resolved through discussion). As a later analysis of the stories revealed, the length and the number of punctuation marks that were supposed to be applied varied only marginally in each student over the course of the 12 days. The 36 stories produced by Anja, Ben, and Christine consisted of between 78 and 103 words ($M = 90.19$; $SD = 6.36$).

During phases A and C, the children just wrote their texts. However, at the beginning of the B phase, the participants were asked to sign a contract like the one in Figure 1 and comply with it.

The graduate student took a couple of minutes to determine the correctly used punctuation marks and praised the children for their efforts and achievements. If Anja, Ben, and Christine reached the benchmark as outlined in the contract in Figure 1, they received a coupon for 10 minutes of computer time (the benchmark was the same for all children). Before asking the participants to sign the agreement, I made sure that this reward was actually viewed as desirable by all three children. After the contract expired, the participants continued to produce stories but received neither feedback nor tokens.

On the day after the last probe, I conducted short, informal interviews of about 5 minutes with the participants, asking them if they cared for the intervention, whether it helped them in their endeavors to perform better, and if they would like to use contracts again during instructional time. I tape-recorded the conversations and subsequently put the basic gist of the responses into writing.



Punctuation Use Contract

Behavior: When fulfilling her writing assignment, Anja will at least use 15 lines for her story and try her best to apply punctuation marks correctly.

Criteria: If Anja uses at least 15 lines for her story and the teacher determines that the portion of correctly used punctuation marks exceeds 80%, …

Reinforcement: … then Anja will earn a coupon for 10 minutes of computer time. The coupon may be redeemed the next day at school.

Contract Period: March 11 to March 14.

Signed: _____ Teacher

_____ Anja

Figure 1. **Contingency contract between Anja and the female graduate student who served as interventionist.**

Results

In Table 1, descriptive statistics of the data in the three different phases are depicted for each participant. All data were analyzed using the SCDA package (0.8) for R by Wilbert (2019).

Table 1. ***Descriptive Statistics for Correctly Used Punctuation Marks Produced by the Three Participants***

	Anja	Ben	Christine
Minimum A	0.00	0.00	0.00
Maximum A	0.00	25.00	20.00
Mean A	0.00	13.35	8.00
Minimum B	83.30	81.30	72.20
Maximum B	92.90	93.80	100.00
Mean B	88.85	87.95	86.50
Minimum C	66.70	75.00	75.00
Maximum C	100.00	100.00	87.50
Mean C	81.48	90.95	82.37

During baseline, Anja did not use any punctuation marks. As soon as the contract was in place, her performance increased dramatically to 88.85% on average. With a mean portion of 81.48%, Anja was able to maintain this high level of achievement even after the agreement expired. Ben started out with an average of 13.35% of correctly applied punctuation marks. He too managed to boost his performance to an impressive average height during the B phase. In his case, it reached 87.95%. Most impressively, he obtained his peak accomplishment during phase C (mean of 90.95%). Christine used 20.00% of her punctuation marks appropriately during baseline, 86.50% during phase B, and 82.37% during maintenance. Thus, the contract seemed to also serve its purpose with her. Figure 2 illustrates the performance development in the three children in graphical form.

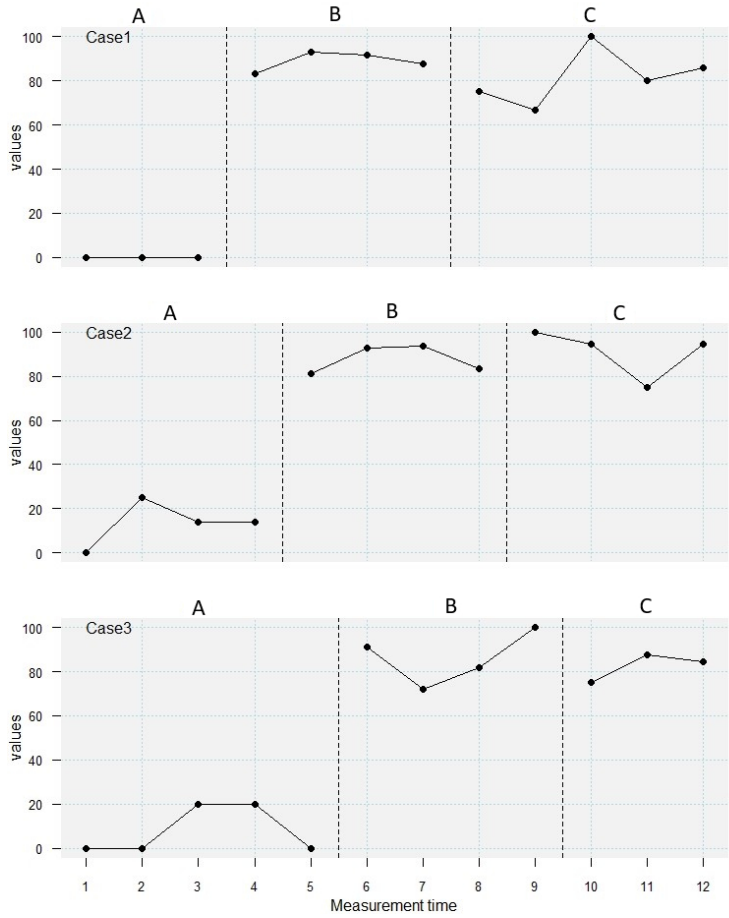


Figure 2. **Percentage of correctly used punctuation marks for Anja (Case 1), Ben (Case 2), and Christine (Case 3).**

As can be seen, the degree to which the three participants applied punctuation marks correctly did not fluctuate to a great degree within each condi-tion. Comparing phases A with phases B and C combined, every common nonoverlap effect size (percentage of nonoverlapping data, percentage of data exceeding the median, nonoverlap of all pairs, percentage of all nonoverlapping data, etc.) reached the maximum value of 100%. A piecewise regression analysis (Huitema & McKean, 2000) for the four students yielded the results shown in Table 2.

Table 2. ***Piecewise Regression Model for Correctly Used Punctuation Marks (Level 1 Analysis)***

	B	*SE*	*t*	*p*	R^2
	Anja				
Intercept	0.00	14.67	0.00	1.000	
Trend	0.00	6.79	0.00	1.000	0.00
Level Phase B	86.00	14.67	5.86	0.001***	0.19
Level Phase C	–19.49	12.88	–1.51	0.181	0.01
Slope Phase B	1.14	8.04	0.14	0.892	0.00
Slope Phase C	2.33	5.26	0.44	0.673	0.00
	Ben				
Intercept	5.40	13.02	0.42	0.693	
Trend	3.18	4.76	0.67	0.529	0.00
Level Phase B	67.83	15.77	4.30	0.005**	0.13
Level Phase C	11.17	15.77	0.71	0.505	0.00
Slope Phase B	-2,46	6.73	-0.37	0.727	0.00
Slope Phase C	–4.34	6.73	–0.65	0.543	0.00
	Christine				
Intercept	2.00	12.45	0.16	0.878	
Trend	2.00	3.75	0.53	0.613	0.00
Level Phase B	65.30	17.20	3.80	0.009**	0.11
Level Phase C	–18.93	20.68	–0.92	0.395	0.01
Slope Phase B	1.60	6.50	0.25	0.814	0.00
Slope Phase C	1.20	9.93	0.12	0.908	0.00

Note: ** Significant at the 1% level; *** significant at the 0.1% level.

As can be seen, all three participants showed a distinct level effect between phase A1 and B. In all cases, there was a succinct and immediate increase in performance as soon as the contract went into effect. Every other comparison did not even come close to falling below the significance level of 5%. To complete the statistical data analysis, the three cases were aggregated into one using hierarchical linear modeling (see Table 3).

Table 3. Hierarchical Linear Modeling for Correctly Used Punctuation Marks (Level 2 Analysis)

	B	*SE*	*df*	*t*	*p*
Intercept	3.85	5.29	28	0.73	0.473
Trend	1.52	1.73	28	0.88	0.385
Level Phase B	73.14	7.81	28	9.36	<0.000***
Level Phase C	–9.02	8.00	28	–1.13	0.266
Slope Phase B	0.30	3.04	28	0.10	0.923
Slope Phase C	–0.36	3.37	28	–0.11	0.916

Note: *** Significant at the 0.1% level.

The results of the Level 2 analysis presented in Table 3 substantiate the previous findings: Contingency contracting seemed to elicit a sudden intervention effect, which was maintained on a high level even after the treatment was terminated. During the informal feedback sessions at the end of the experiment, all students commented that they enjoyed receiving feedback and that the contract clearly motivated them to focus on the correct use of punctuation marks. They articulated that they usually did not like to write but that the contract made it much easier for them to attend to the task. Experiencing a distinct and abrupt increase in performance made them feel confident in their ability to learn and make progress. They expressed the view that this incident encouraged them to keep trying hard to produce high-quality texts with proper spelling, grammatically correct language, and accurate punctuation marks.

Discussion

The principal aim of this study was to evaluate the benefits of a simple intervention (contingency contracting) for facilitating students' proper use of punctuations in freely produced texts. Before the agreement was in force, the three participants hardly applied any graphic marks or nonalphabetic signs correctly. In fact, the percentage of properly used punctuation marks varied between

0.00 and 13.35 on average during baseline conditions. Immediately upon the onset of the intervention, the ratio increased markedly, reaching mean levels between 86.50% and 88.85%. Fortunately, all three students maintained this high degree of proficiency with an average percentage of correctly used punctuation marks between 81.48 and 90.95 after the intervention. Visual inspection, effect size estimates, and piecewise regression modeling all speak to the hypothesis that the treatment caused an immediate boost in performance that stayed up on a formidable standard even after the contract expired. This is all the more impressive given the fact that the agreement had a validity span of only 4 days. Such a short time period seemed to suffice to help the participants focus on punctuation marks and how to use them correctly. Furthermore, informal feedback from the students indicated that the contracts motivated them to write better stories with proper punctuation marks.

As in any other study, this experiment yielded some limitations that deserve further attention. First of all, the contingency contracts were only in effect for 4 days. Even though all three participants seemed to be very motivated to perform well and showed great improvements, there is no way to tell whether the intervention would have lost its power had it gone on a little longer. Not every treatment that is helpful at first has the potential of being beneficial in the long run. If contingency contracts were part of every school lesson in all subject areas, they could possibly become a matter of course and more or less "toothless."

In addition, the agreements were introduced to help struggling students focus on correctly applying punctuation marks, a skill in which they already had a moderate level of competency. However, they hardly demonstrated it in contexts in which they had to attend to a great number of demands during complex writing tasks, due to strains on the working memory. Even though the contingency contracts clearly elicited a remarkable increase in performance, it is unrealistic to assume that it affected the children's basic ability to temporarily store and manipulate information. Thus, it could be suspected that the cognitive resources that the participants used to apply punctuation signs correctly were lacking for attending to other subtasks important for text production. However, an informal appraisal of the stories by a senior college student assistant who was blind to the purpose of the study did not suggest that the texts were missing out on any other important feature whenever the participants focused on using standard marks in writing properly.

Measuring social validity (see Wolf, 1978) through the aforementioned informal interviews alone may not adequately represent the extent to which the intervention was accepted by the children. The procedure could have been more systematic and sophisticated. In addition, it is not only the participants' standpoints that should have been taken into account. For a treatment to claim social

significance in an educational context, it is necessary to also include the views of other relevant protagonists such as teachers and parents (Kazdin, 2005).

But despite all limitations discussed here, the merits of this study cannot be dismissed. It documents that the correct use of punctuation marks can be fostered by extraordinarily little means. Teachers long for effective techniques they can implement without much effort. Instructing a whole class of often very diverse students can be extremely demanding (Fuchs et al., 2015; Sigstad, 2017; Wearmouth, 2004). Having a set of tools that help struggling learners to increase their performance quickly and to experience a sense of achievement cannot not be prized highly enough. A great share of students have become demoralized by a long history of failure and by perpetuating feelings of inadequacy. They need to break away from the downward spiral of frustration, disconnection, and stress (Vaughn & Bos, 2014).

Future studies should focus on fathoming the long-term effects of contingency contracting with different and larger samples. In addition, they ought to broaden the research base on which competencies and skills can at least temporarily be enhanced by this technique. Even though focusing on correct punctuation marks did not seem to negatively affect other aspects of the mechanics of written language or the quality of the text products, further research is necessary to verify this assumption. Finally, capturing the social validity of experiments on the benefits of contingency contracting should include not only informal feedback from students. To pave the way for sustainably implementing this tool in daily teaching practice, it is necessary to gather more well-grounded information from different perspectives on which obstacles might prevent this from happening. Further pursuing the path of gaining more insights into how long, in what way, when, and with whom to apply contingency contracting is certainly worthwhile. The available data speaks to the potential that this tool seems to have in making a meaningful and swift impact on students' motivation to perform well and on their achievement.

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Author's Note

Correspondence concerning this article should be addressed to: Matthias Grünke, Ph.D., Department of Special Education & Rehabilitation, University of Cologne, Klosterstr. 79b, 50931 Cologne, Northrhine-Westfalia, Germany, Phone: 0049-221-4705547, Email: matthias.gruenke@uni-koeln.de.