



# Assessing Online Supplemental Instruction in an Introductory Community College Cell and Molecular Biology Class



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## Introduction

For many students, Biology 190 (Introductory Cell and Molecular Biology) can be their first science course in college and has proven to be a barrier to students continuing their biology education. In order to help students, Truckee Meadows Community College (TMCC) offers Supplemental Instruction (SI) which is a nontraditional form of tutoring for traditionally difficult courses with a 30% or higher D/W/F rate. SI focuses on collaborative group study and discussion, and is led by a trained peer (supplemental instructor) who has successfully completed the course.

With COVID came further challenges for students and faculty. Due to institutional requests, SI was moved to an online format. This raises a broad question however, is online supplemental instruction (OSI) as effective as in-person SI?

Currently, the fundamental goals of this project are to determine (1) if OSI attendance a predictor of BIOL 190 course GPA, and (2) if BIOL 190 course GPA's are significantly different among students who attend OSI, or no OSI at all.

## Growing Our Learning Community

Over the past four semester, faculty at TMCC reorganized multiple sections of the BIOL 190 course in collaboration with faculty at UNR to replicate the success UNR had seen in their BIOL 190 program. Our approach was to “flip” the classroom by providing pre-lecture videos with follow-up assignments to be completed before class. This freed up lecture time so that we could bring more active learning strategies into the classroom. Fundamental to our project, peer-discussion leaders were hired who were responsible for leading SI (Fig. 1A).

Figure 1A. The general format of BIOL 190 courses at UNR and the pilot program at TMCC



SI leaders are TMCC students selected by the lead faculty. As a part of this program, SI leaders working at TMCC meet regularly with their faculty mentor to prepare lesson plans and discuss effective teaching strategies. These regular meetings help SIs develop teaching skills and maintain a “through-line” from pre-lecture video all the way through discussion (Fig. 1B). In the Spring of 2020 the program was moved online. SI leaders and faculty still met once a week, and kept open communication throughout the week, to plan each SI session.

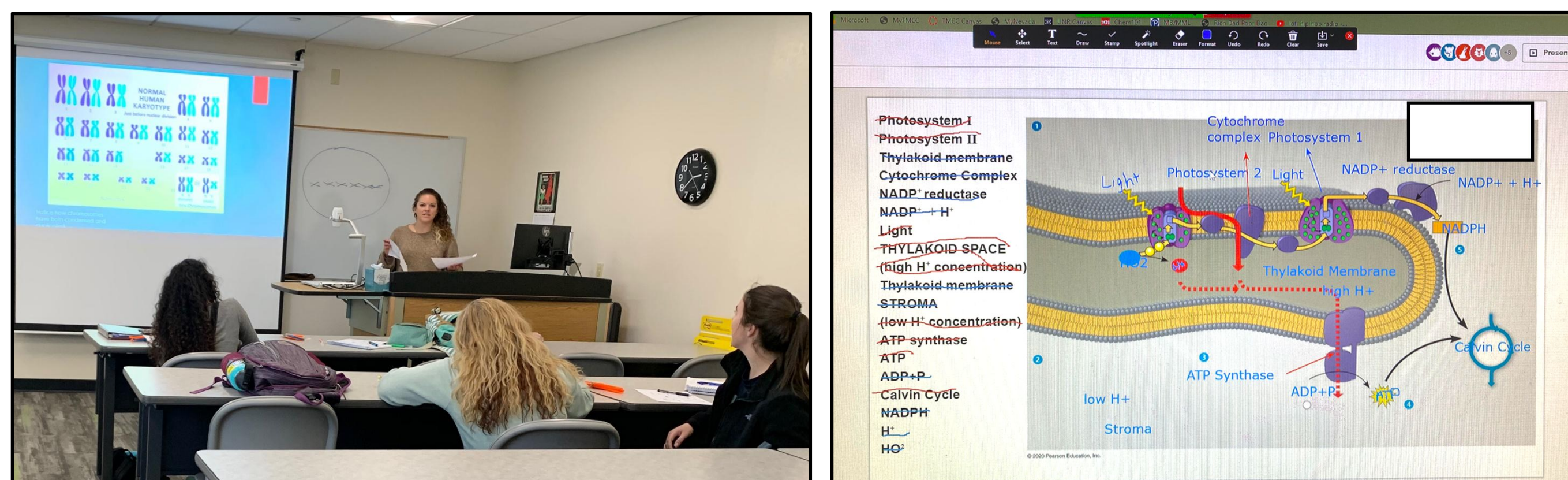


Figure 1B/1C. Discussion leaders hold weekly sessions with their students. Spring 2020 SI sessions were help online/virtually. These sessions are completely peer-led with no TMCC faculty involvement during discussions. Here you can see an in-person SI, and student group work from online SI.

## Methods

To identify if OSI attendance is a predictor of BIOL 190 course GPA, **multiple linear regression using the enter method** was used. Here, the variables course GPA, first generation status, ethnicity, student type, enrollment status, gender, and Accuplacer scores were all assessed. To assess if there is a significant difference between the course GPA of students who attend OSI and those who do not, a **Students T-test** was used.

SI attendance was tracked using the online tool Accudemia. All other data was collected from the TMCC Institutional Research Office.

## Results

**Q1: does BIOL 190 course GPA differ significantly between those who attend OSI and those who do not?**

	OSI	No OSI
N	50	394
Mean	1.916	1.471
Min	0.000	0.000
Max	4.000	4.000
Std. Dev	1.303	1.471

Table 1A: Descriptive statistics table from Fall 2020 BIOL 190 students. In one cohort, the intervention of OSI was used. In the second cohort, no students attended OSI

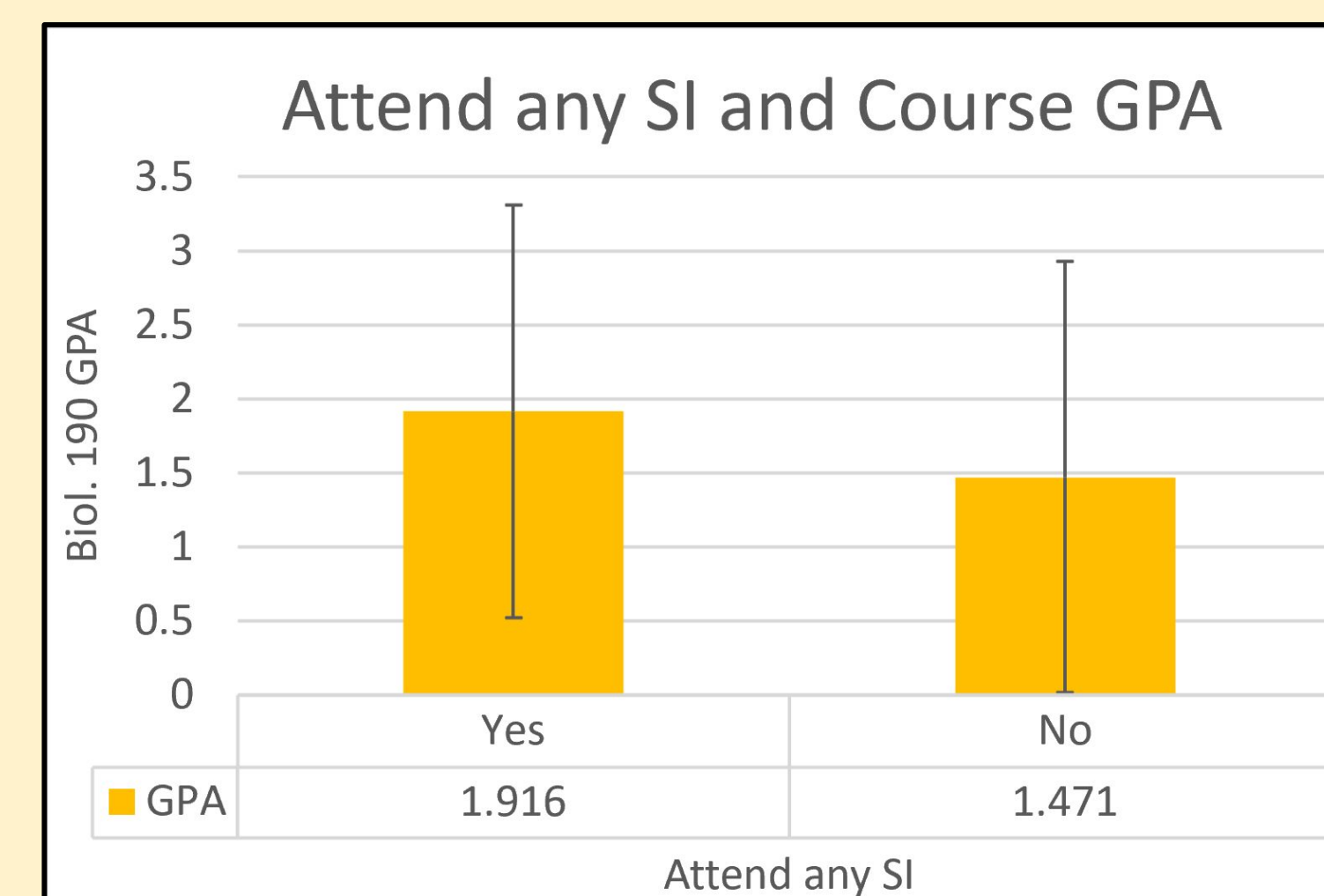


Figure 2. This graph shows by how much whether a student participated in any SI at all or not affected student's course GPA.

Independent Samples T-Test		
	W	p
Course GPA	8040.500	0.029
Note. Mann-Whitney U test.		

Table 1B: Mann-Whitney table.  $P < 0.05$  and therefore there is a significant difference between the two cohorts of students in BIOL 190.

**Q2: Is OSI a predictor of student success in BIOL 190?**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
1	0.633	0.400	0.389	0.248

Table 2A: Multiple linear regression enter method model summary. The R-value indicates a strong effect size.

**Q2: Is OSI a predictor of student success in BIOL 190? Cont.**

ANOVA						
Model		Sum of Squares	df	Mean Square	F	p
1	Regression	17.749	8	2.219	36.057	< .001
	Residual	26.582	432	0.062		
	Total	44.331	440			

Table 2B: Multiple linear regression ANOVA table.  $P < 0.05$  indicating that the model, with all variables included, is significant.

Variable	p-value
Number of SI visits	< 0.001
First Generation	0.012
Student Type	0.02

Table 2C: Table of selected variable coefficients and their corresponding p-values for the above multiple linear regression model. Only number of visits to SI (and therefore SI attendance), and gender are predictors in this model

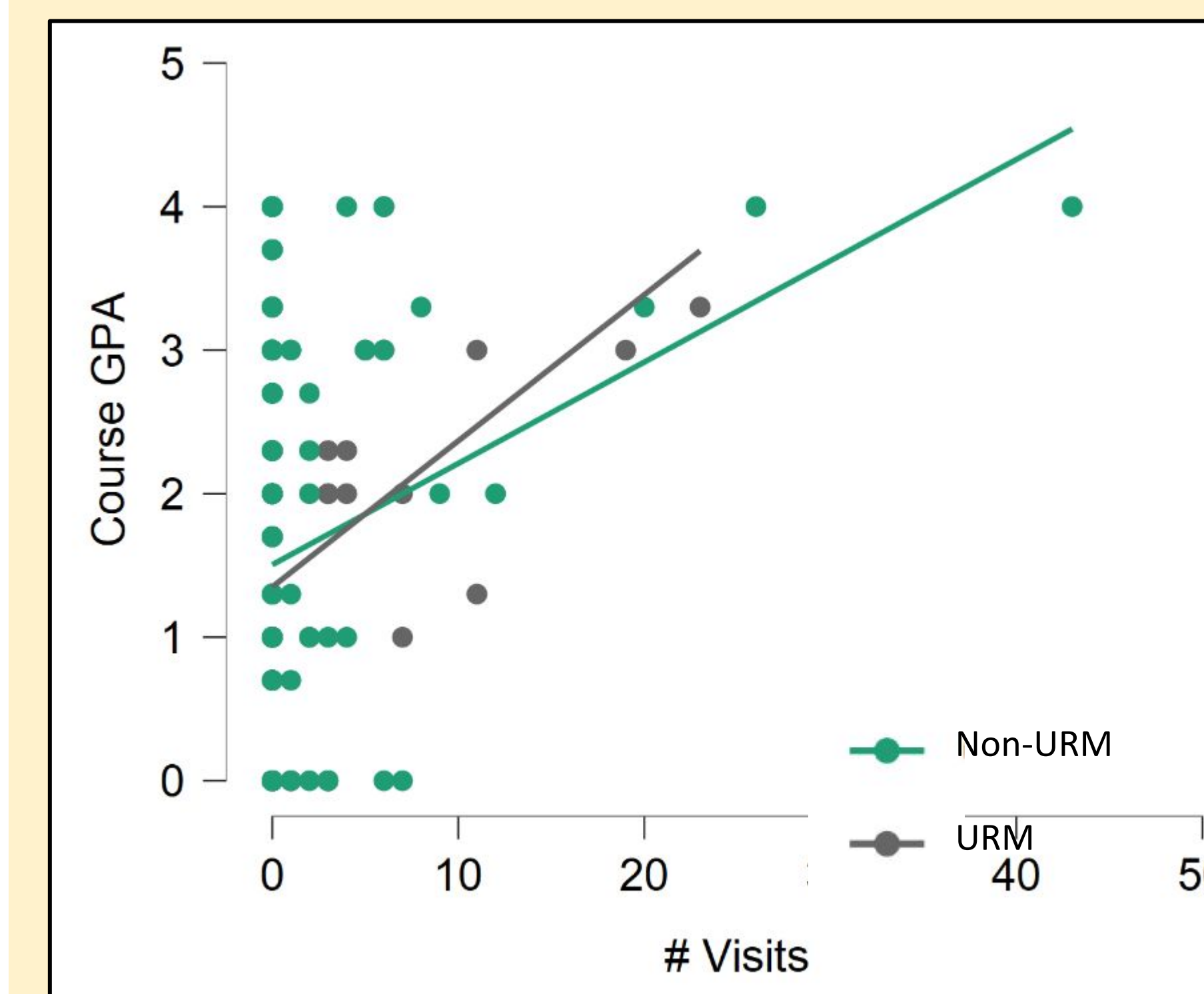


Figure 3. This graph shows how the number of visits affects URM compared to non-URM. Similar to previous research about SI (Yue, Rico, Vang, & Giuffrida, 2018), we found that that for each group (non-URM and URM), the more they attend SI, the better their average course grade becomes.

## Conclusion

- Students who attend OSI earn a significantly higher course GPA as compared to their non-OSI attending counterparts.
- Of the multiple variables included in our multiple regression model, number of visits to SI, Student type, and first-generation status were all predictors of course GPA.
- Given our multiple linear regression model, students can expect to experience a GPA gain of 0.075 GPA points per SI visit.

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