

# “Doing Science” Workshops

5<sup>th</sup> Workshop

Dr. Felix E. Rivera-Mariani

# Learning Objectives in the Workshop Series

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- Understand the different parts of the “real” scientific method
- Design workable goals through a scientific project
- Analyze the different thought processes towards a scientific goal
- Collect data in formats that are “easy”(or “less difficult”) to analyze
- Answer questions related to our data-collection process
- Value the importance of team-work in the scientific process
- Understand, elaborate, and communicate with a scientific mindset

# Learning Objectives in the Workshop Series

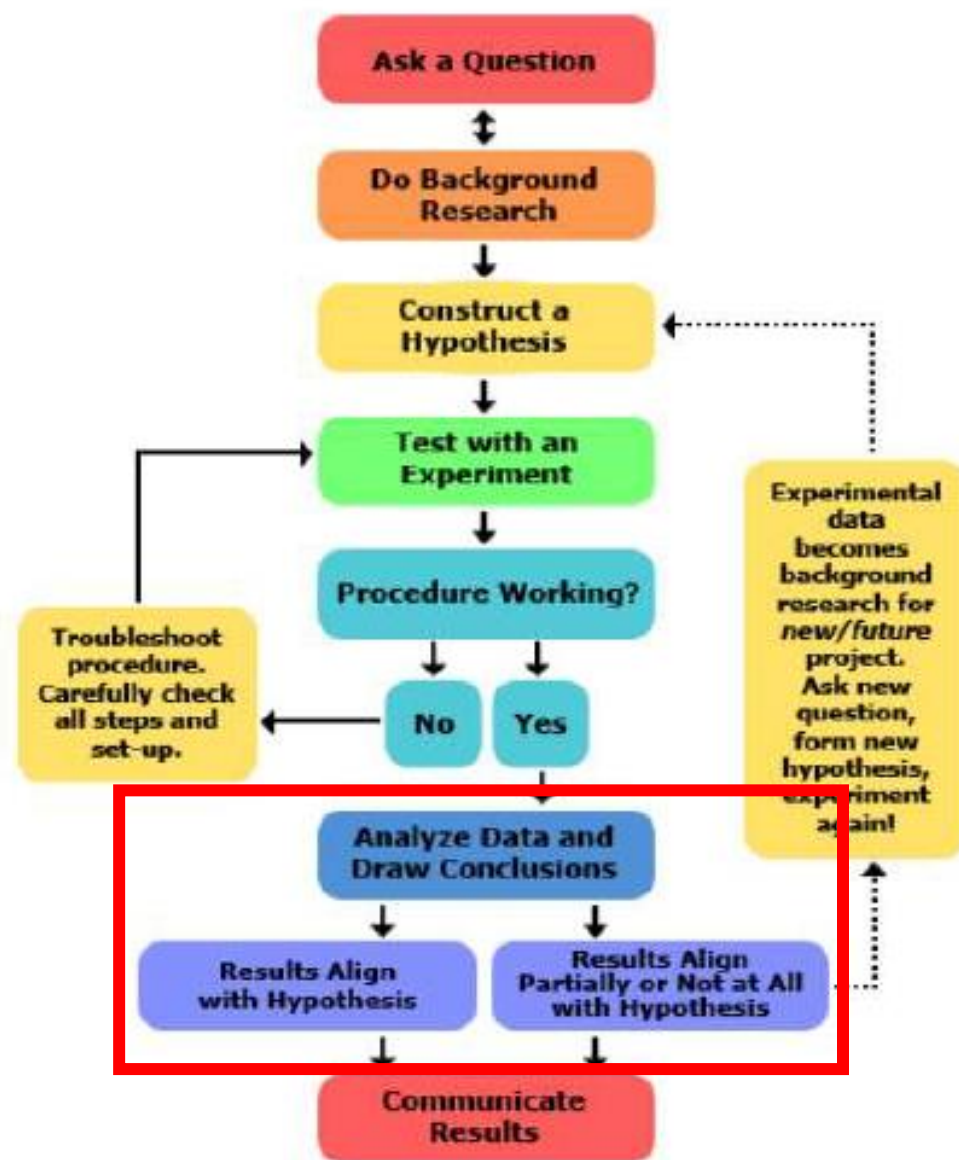
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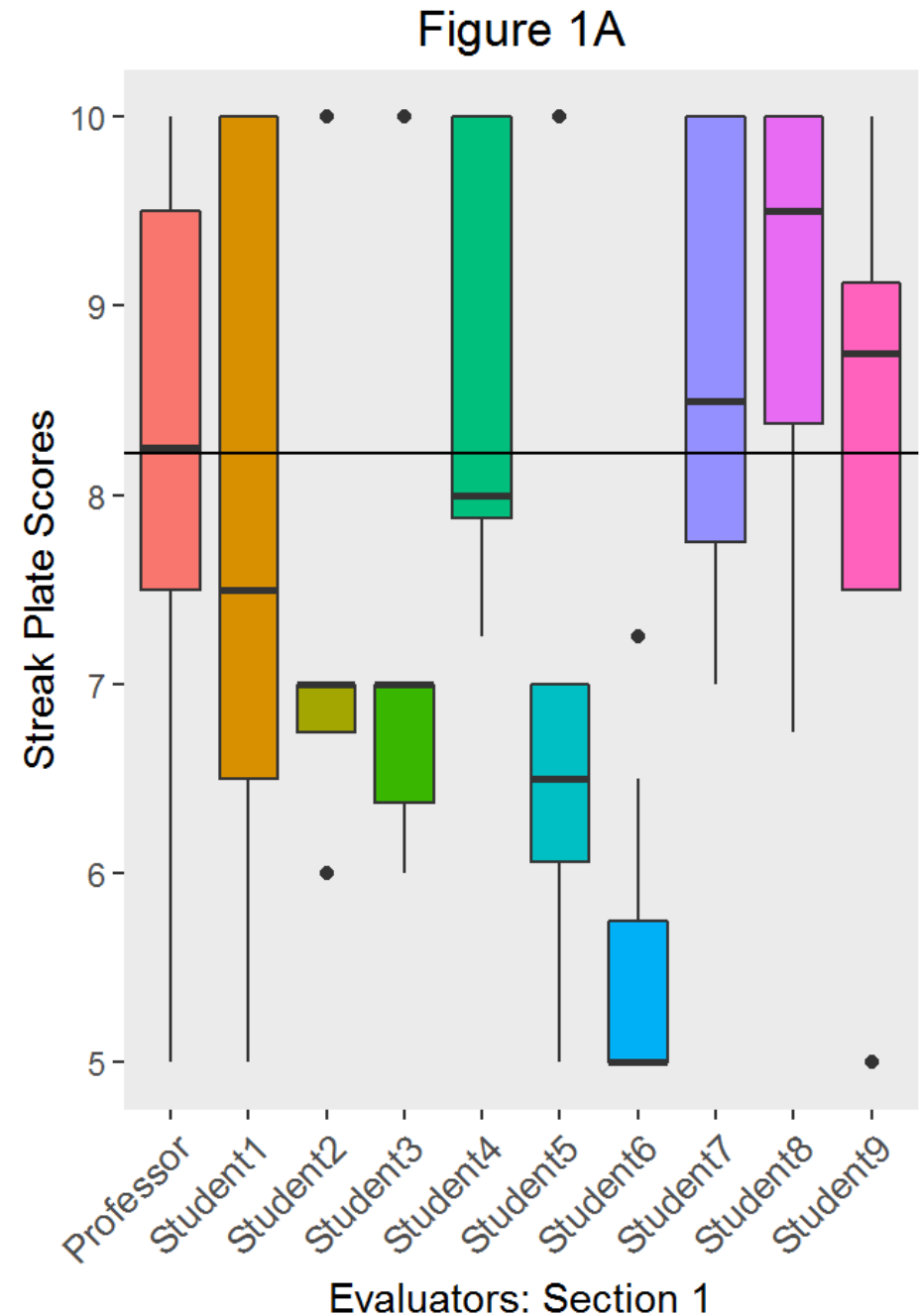
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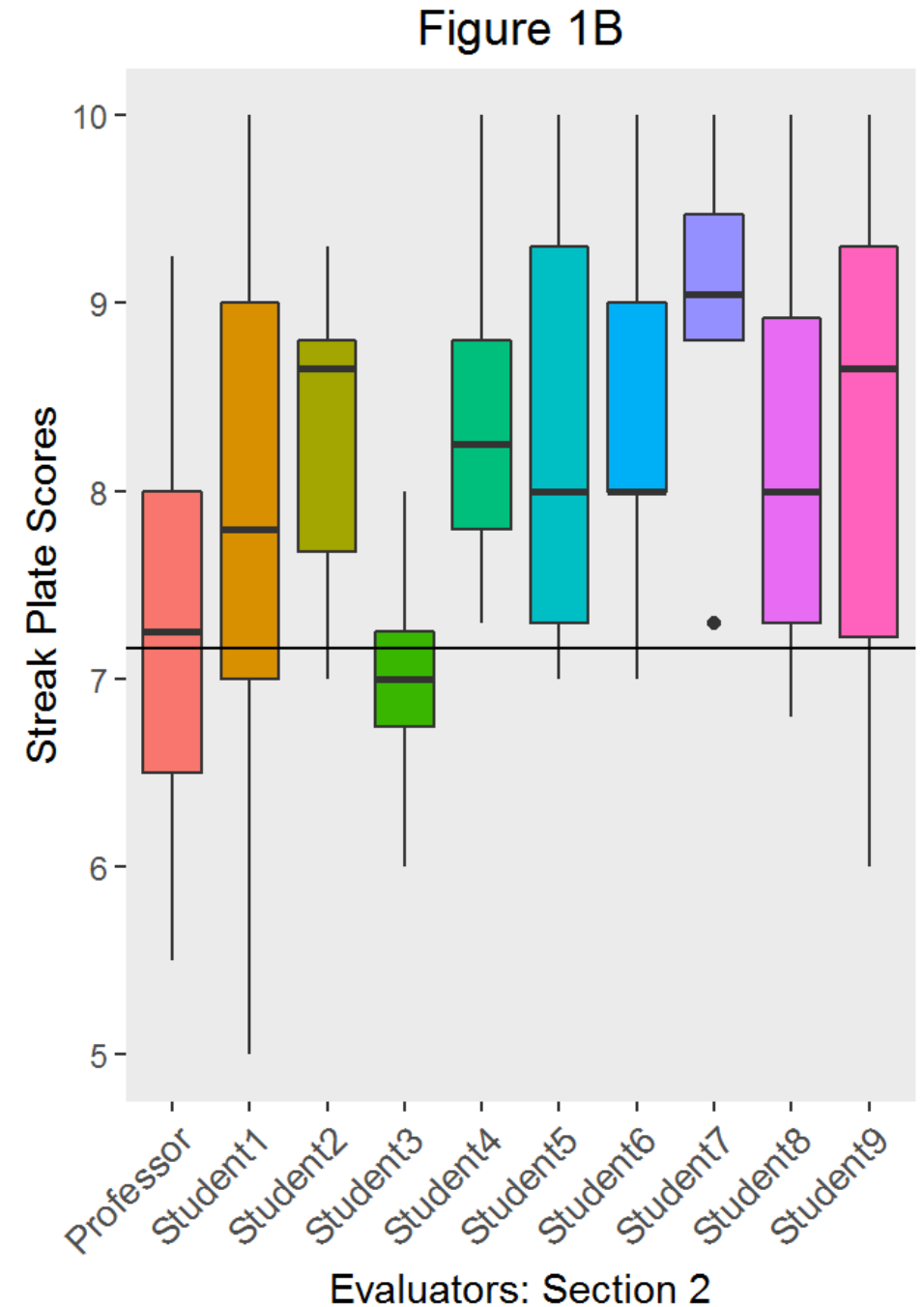
# Interpretation Practice

How can this graph be interpreted? Recall who is the reference for comparison, and that the black line is the mean from the professor's scores?



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# Interpretation Practice

What is the finding when we compare Figure 1A (1<sup>st</sup> group of students) vs Figure 1B (2<sup>nd</sup> group of students)?

Figure 1A

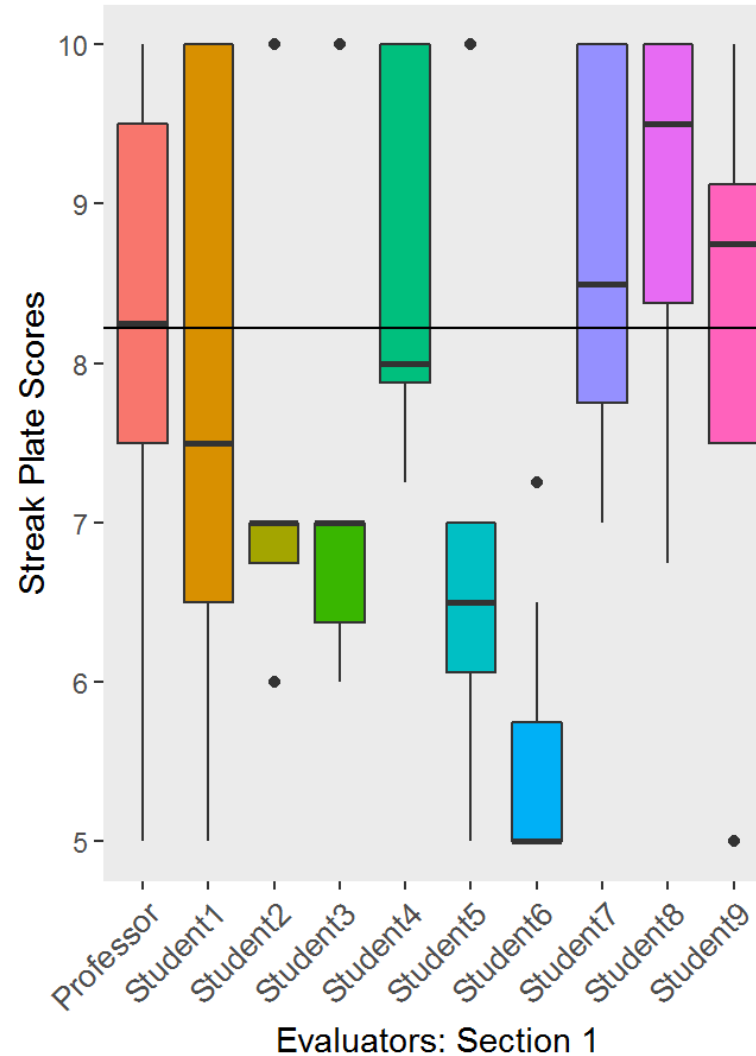
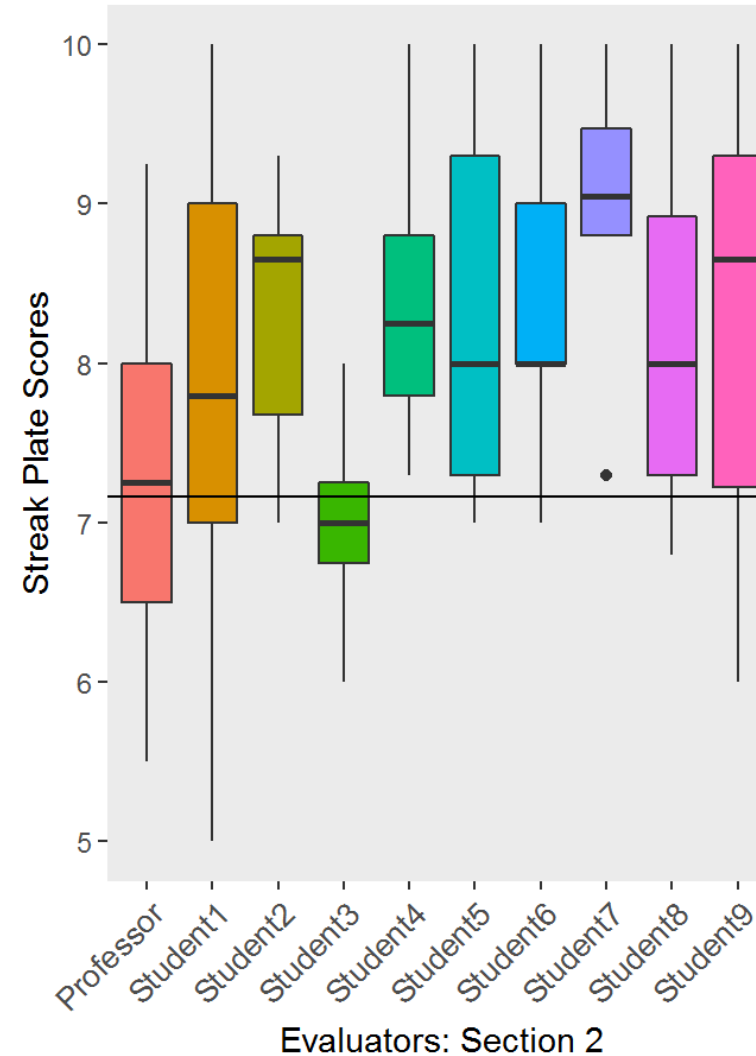
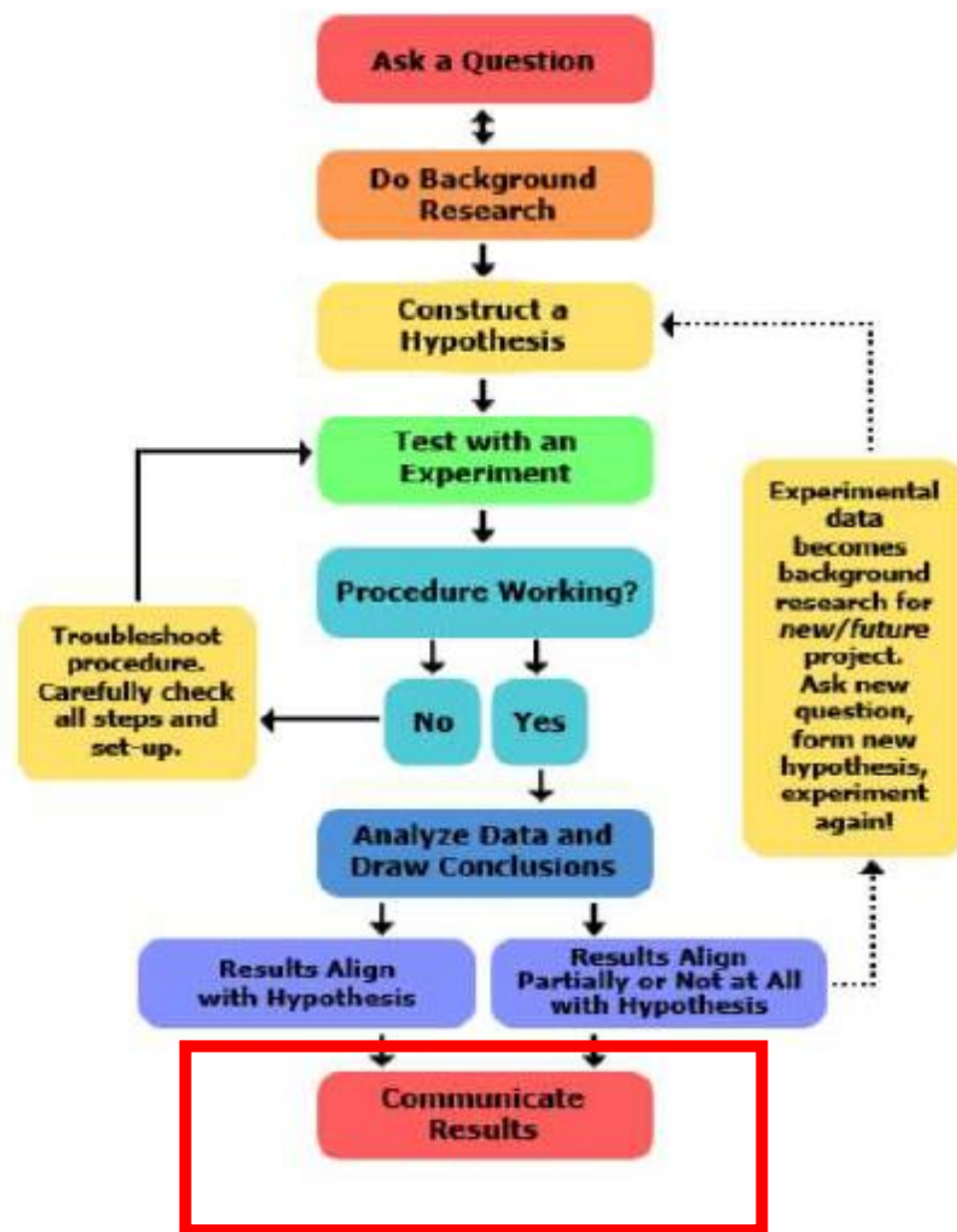


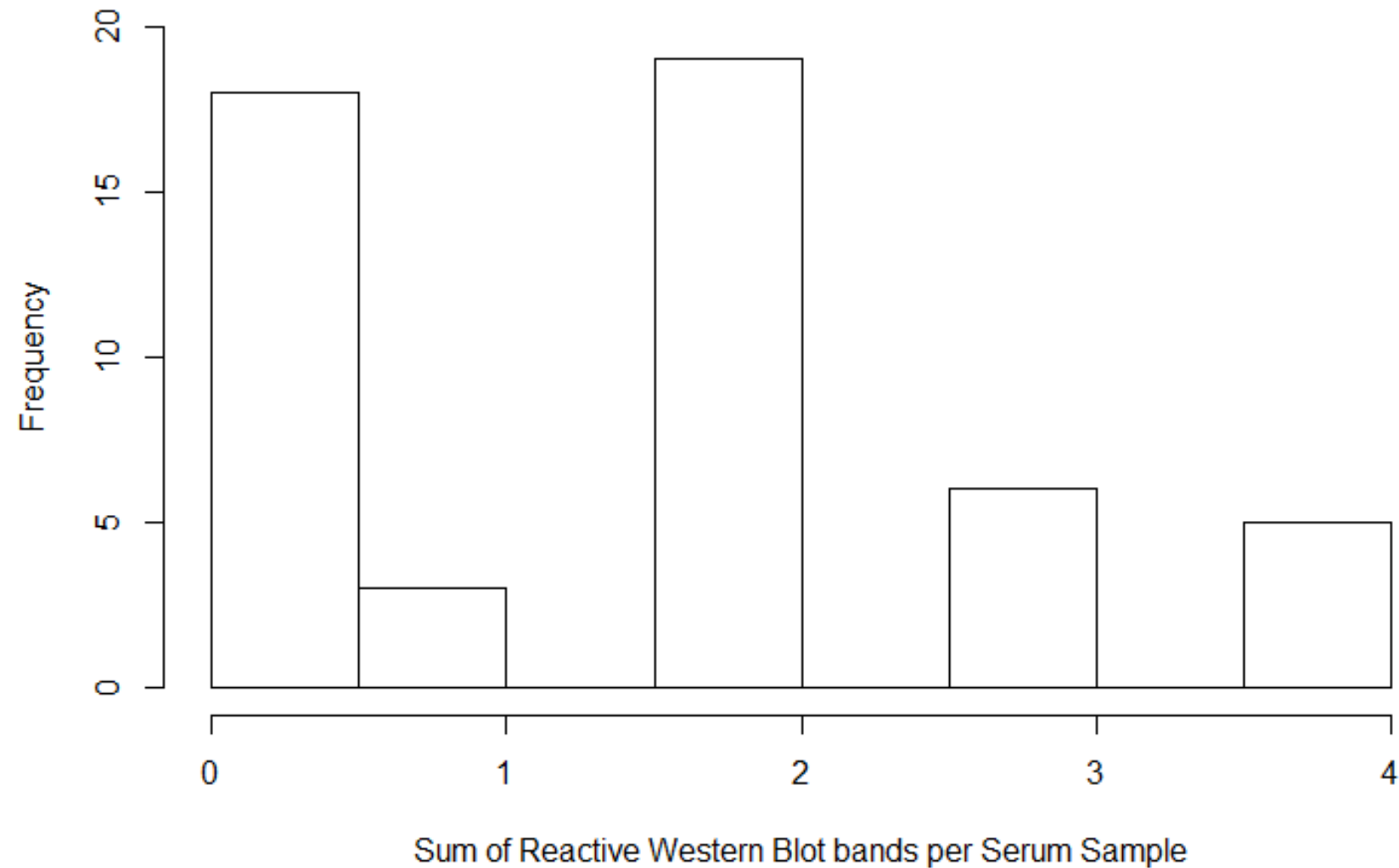
Figure 1B



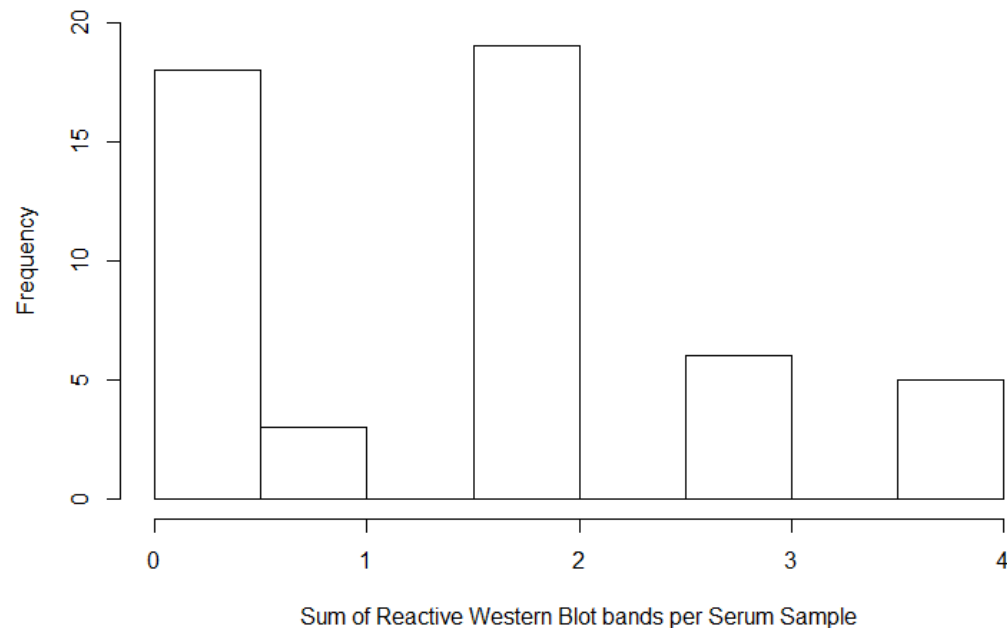




# Data Set – Summary of New Column

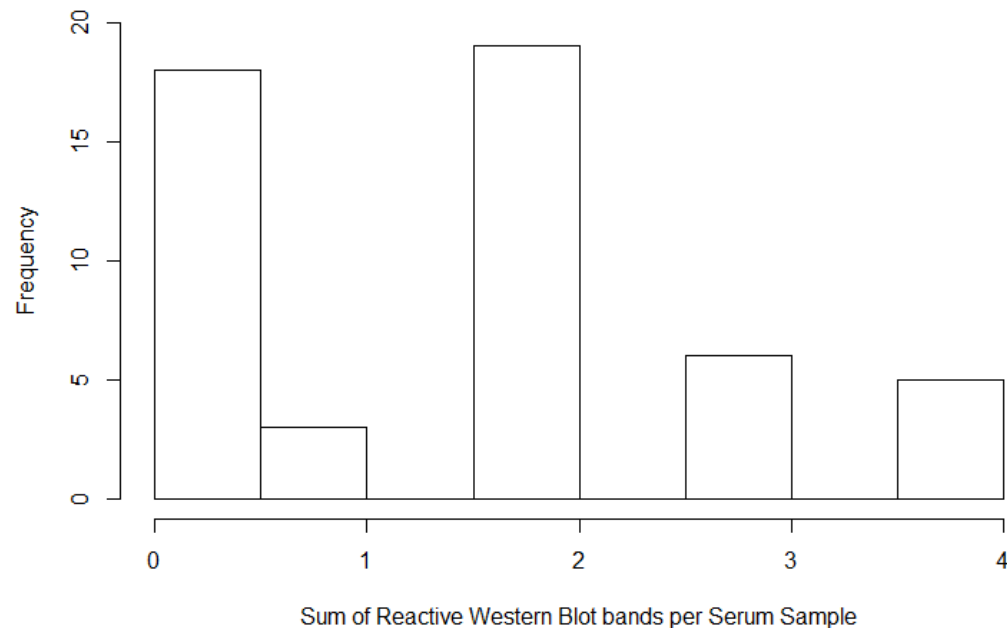


# Which is the most concise way to communicating this result?



- a) Patients' sera in this study reacted against 0, 1, 2, 3 and 4 bands in different proportions.
- b) Most of the patients' sera reacted against two bands or were not reactive at all.
- c) Very few patients' reacted to more than two bands.
- d) Patients' either reacted to one band or were not reactive at all.

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# Proportion of Reactive vs Non-Reactive

Western Blot Band	% Reactive	95% CI Reactive
19 kDa	2/33 = 6.0%	0.70 - 20.2%
24 kDa	1/33 = 3.0%	0.08 - 15.8%
33 kDa	6/33 = 18.0%	7.00 - 35.5%
45 kDa	8/33 = 24.0%	11.10 - 42.3%
56 kDa	29/33 = 88.0%	<b>71.80 - 96.6%</b>
75 kDa	1/33 = 3.0%	0.08 - 15.8%
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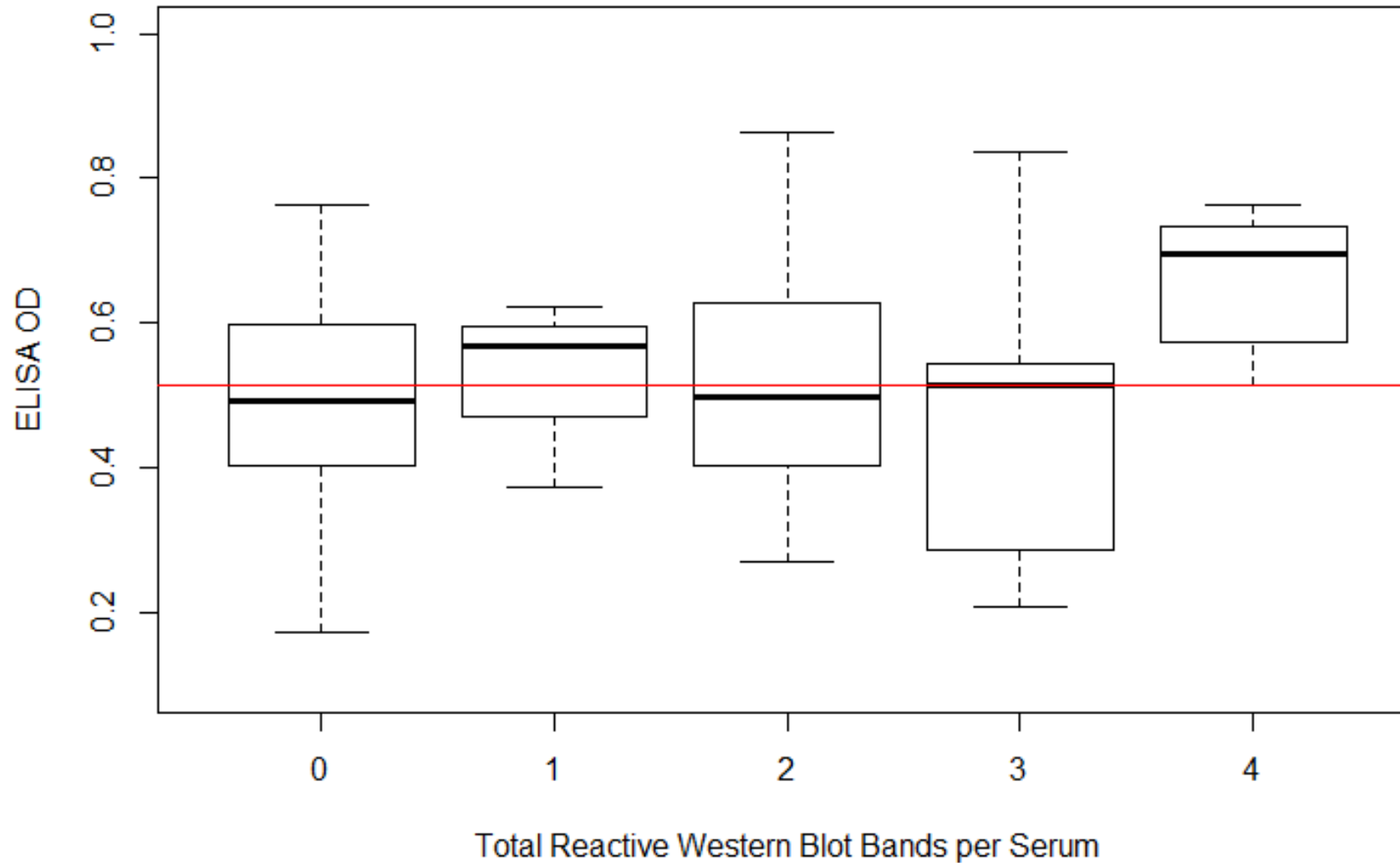
- a) The bands against which the patients' reacted the most were the 56 kDa and 81 kDa bands.
- b) The 19kDa had 6%, 24kDa 24%, 33 kDa 18%, 45kDa 24%, 56kDa 88%, 75 kDa 3%, and 81kDa 97% reactivity.
- c) The 56 kDa and 81 kDa bands had 88% and 97%, respectively.
- d) All the bands except 56kDa and 81kDa were not important.

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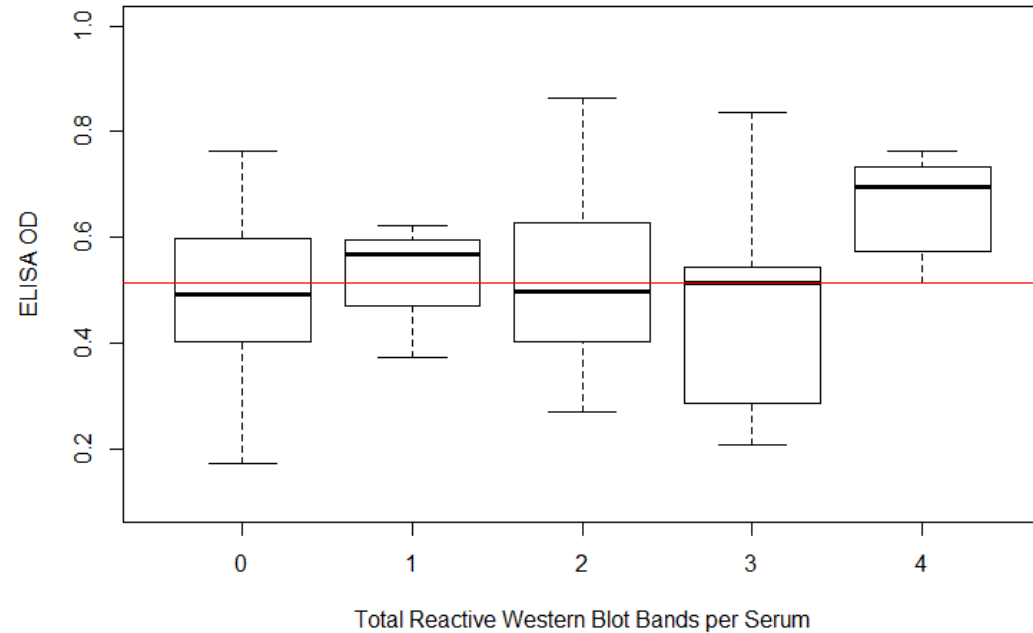
## Dataset – Relationship between Absorbance and Reactivity



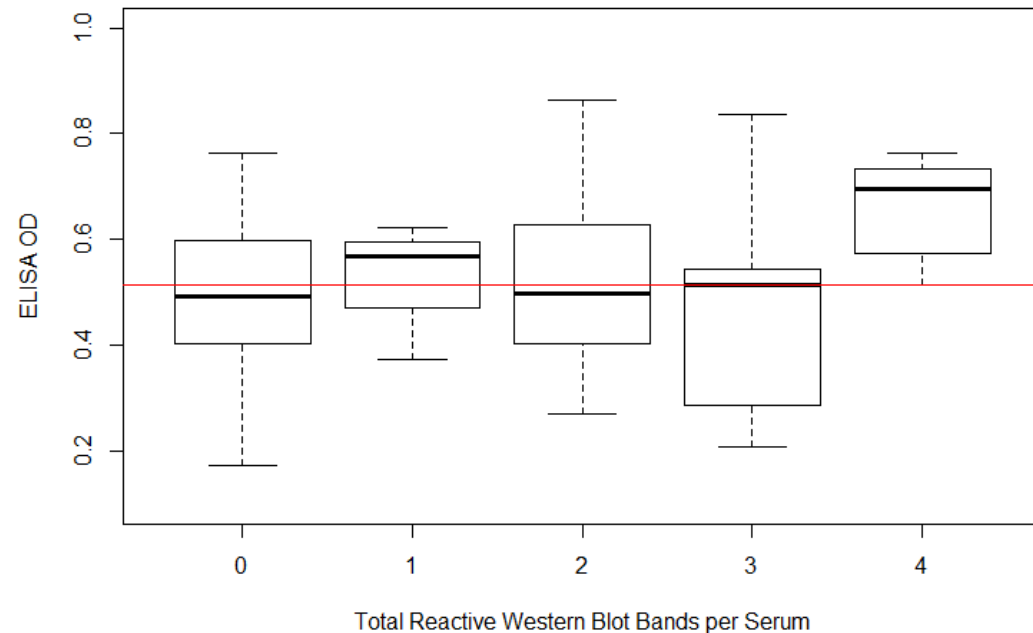


# Dataset – Relationship between Absorbance and Reactivity

- Los primeros cuatro grupos se acercan al promedio ( ) , contrario al grupo 4.

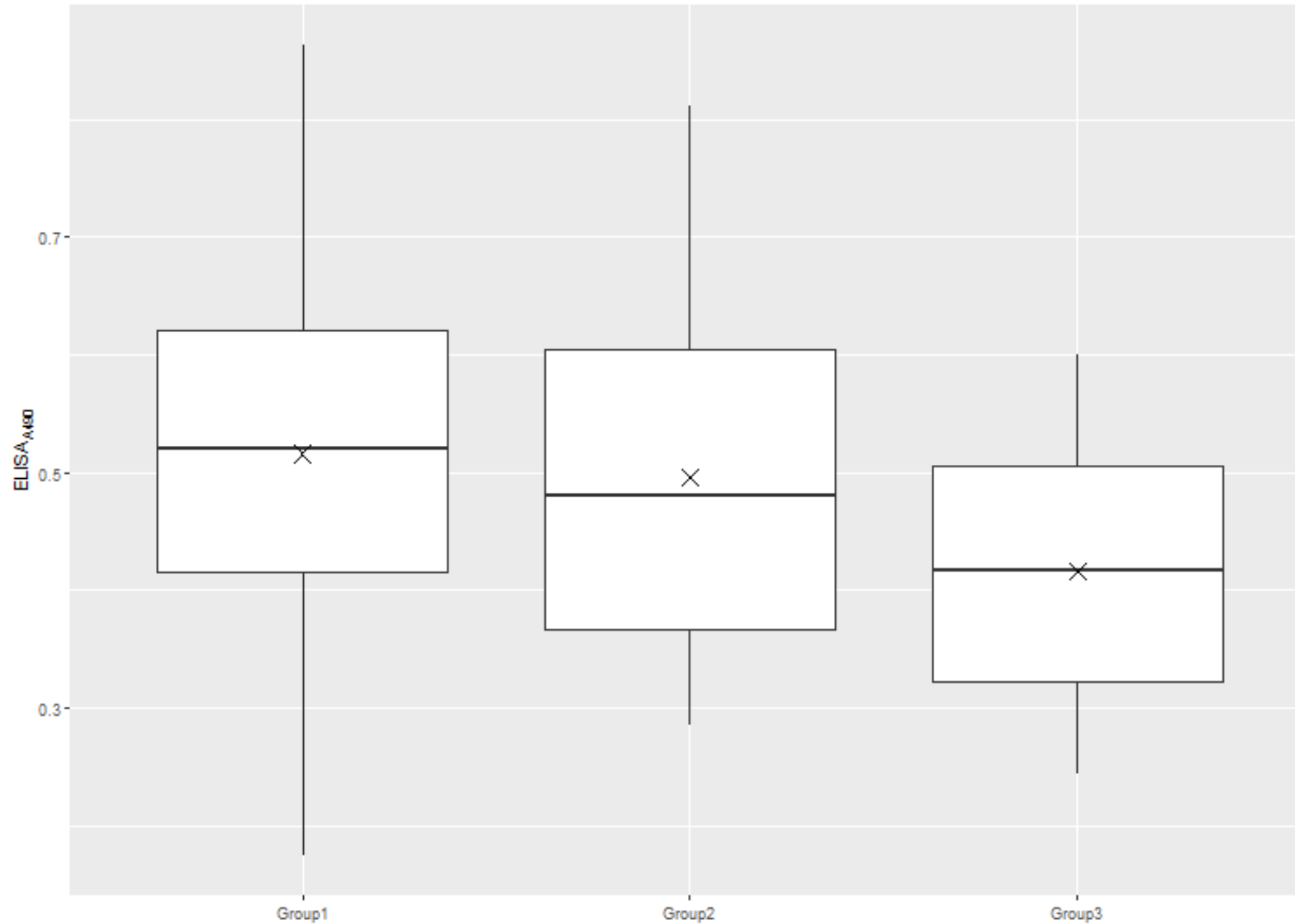


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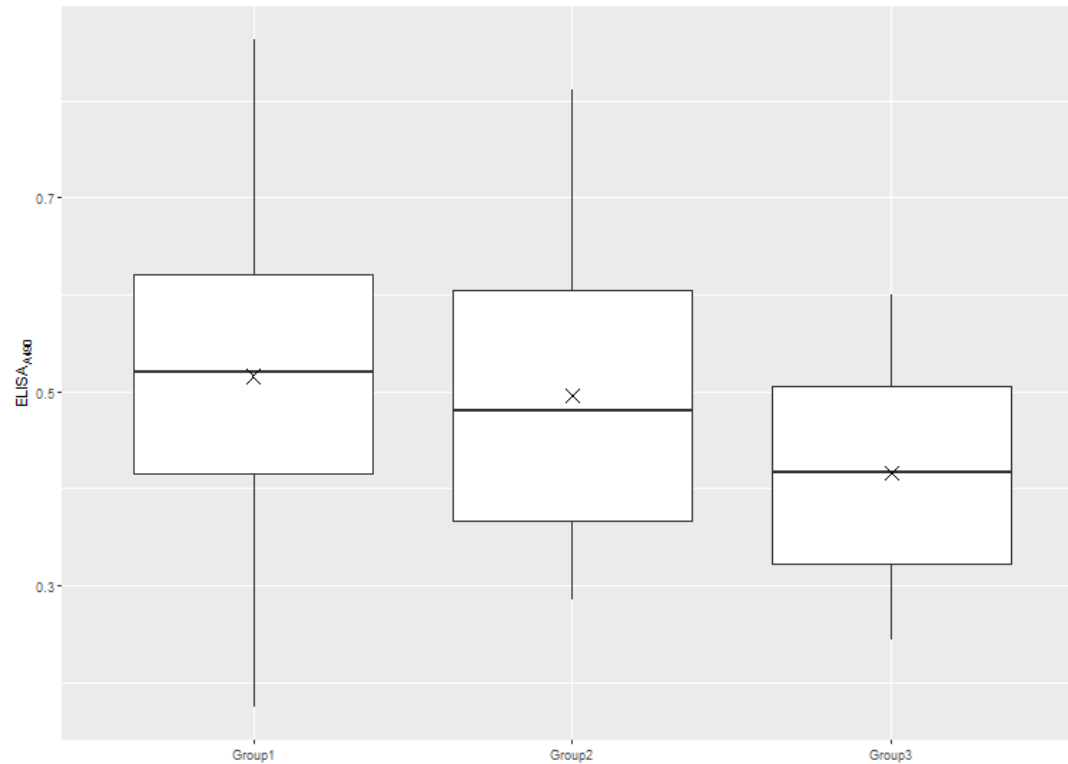


- ~~• Los primeros cuatro grupos se acercan al promedio (), contrario al grupo 4.~~
- Los primeros cuatro grupos se acercan al promedio de absorbancia, contrario al grupo 4 que es mayor que el promedio.

# Interpretation Practice

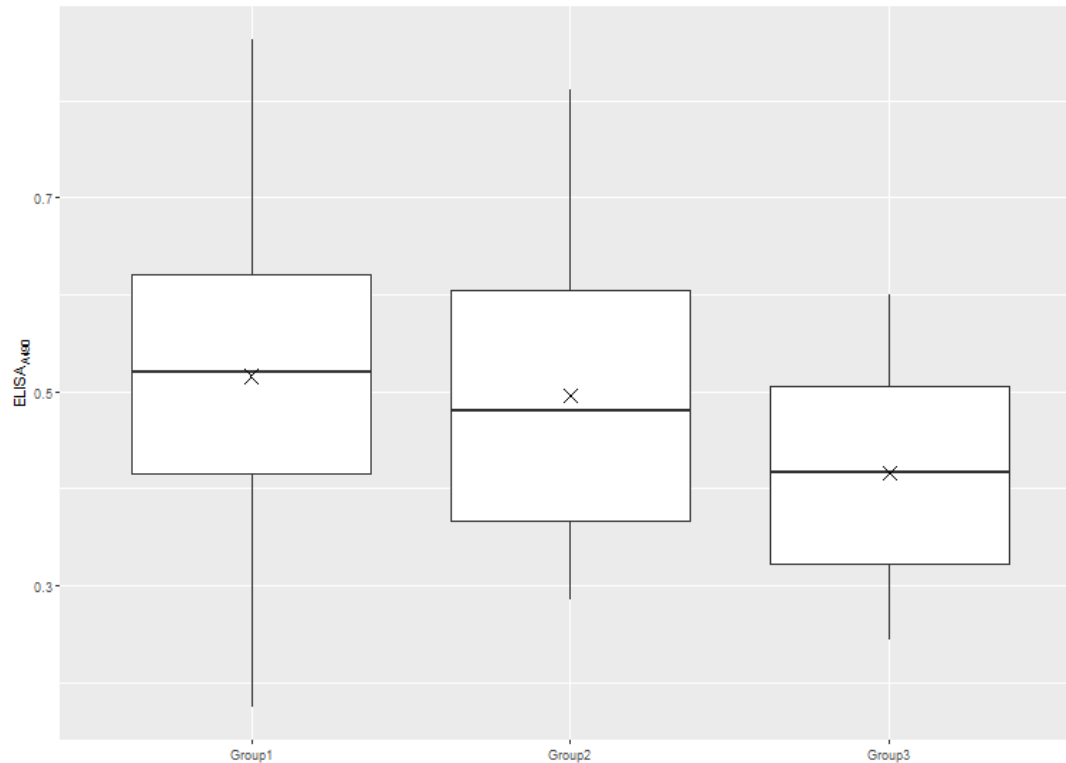


# Interpretation Practice



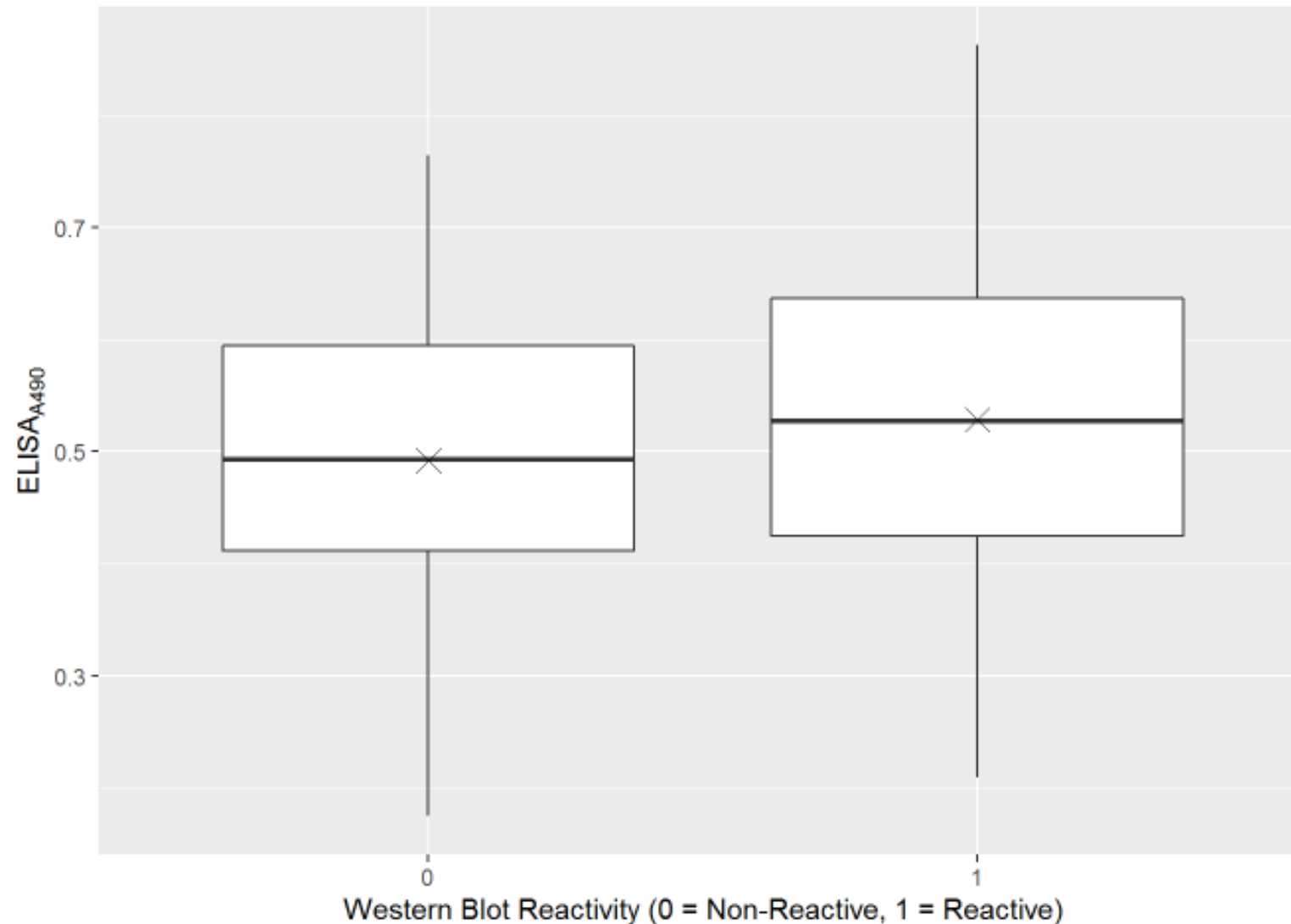
- El primero y segundo grupo no tienen una diferencia, mientras que el grupo 1 y grupo tres tienen mayor diferencia.

# Interpretation Practice

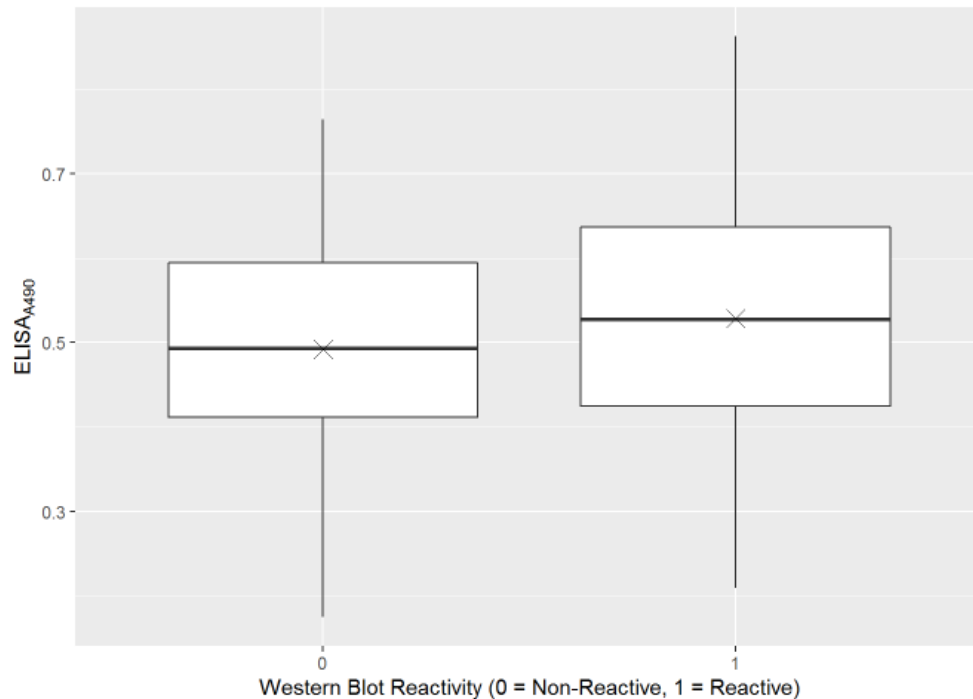


- ~~• El primero y segundo grupo no tienen una diferencia, mientras que el grupo 1 y grupo tres tienen mayor diferencia.~~
- Entre el 1er y 2do grupo hay una minima **diferencia en absorbancia**, mientras que la **diferencia en absorbancia** entre el 1er y 3<sup>rd</sup> grupo es mayor.

# Dataset – Reactive (1+ band) vs Non-Reactive



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- Cuando comparamos **el grupo que reacciona a una o mas bandas** contra el grupo q no fueron reactivos, la diferencia en absorbancia fue minima.

Las siguientes tres “slides” corresponden a graficas en que se estudió como los estudiantes de un curso de laboratorio de microbiología se auto-evaluaban con respecto a una técnica de específica del laboratorio.

Luego que los estudiantes llevaron a cabo esta técnica de laboratorio, cada estudiante evaluó la técnica de cada uno de sus compañeros. La puntuación que podían adjudicar era solamente 5, 7, 8, o 10.

Al culminar la evaluación entre pares, el profesor evaluó a cada uno de los estudiantes se una forma similar a la que los estudiantes se evaluaron entre ellos mismos.

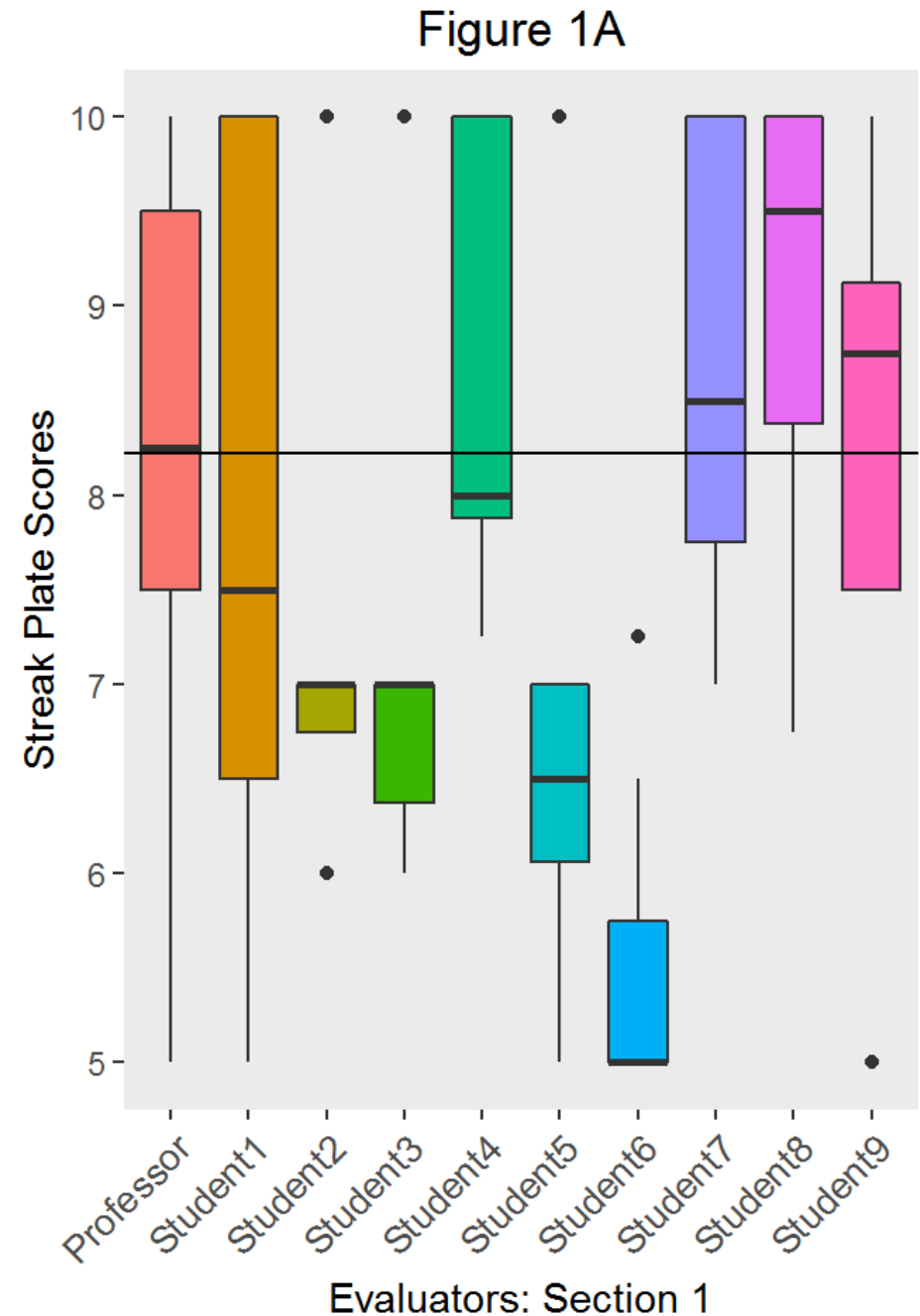
Las gráficas comparan las puntuaciones del profesor con las puntuaciones que reportó cada estudiante. Hay dos gráficas ya que este estudio se realizó en dos diferentes cursos de laboratorio de microbiología.



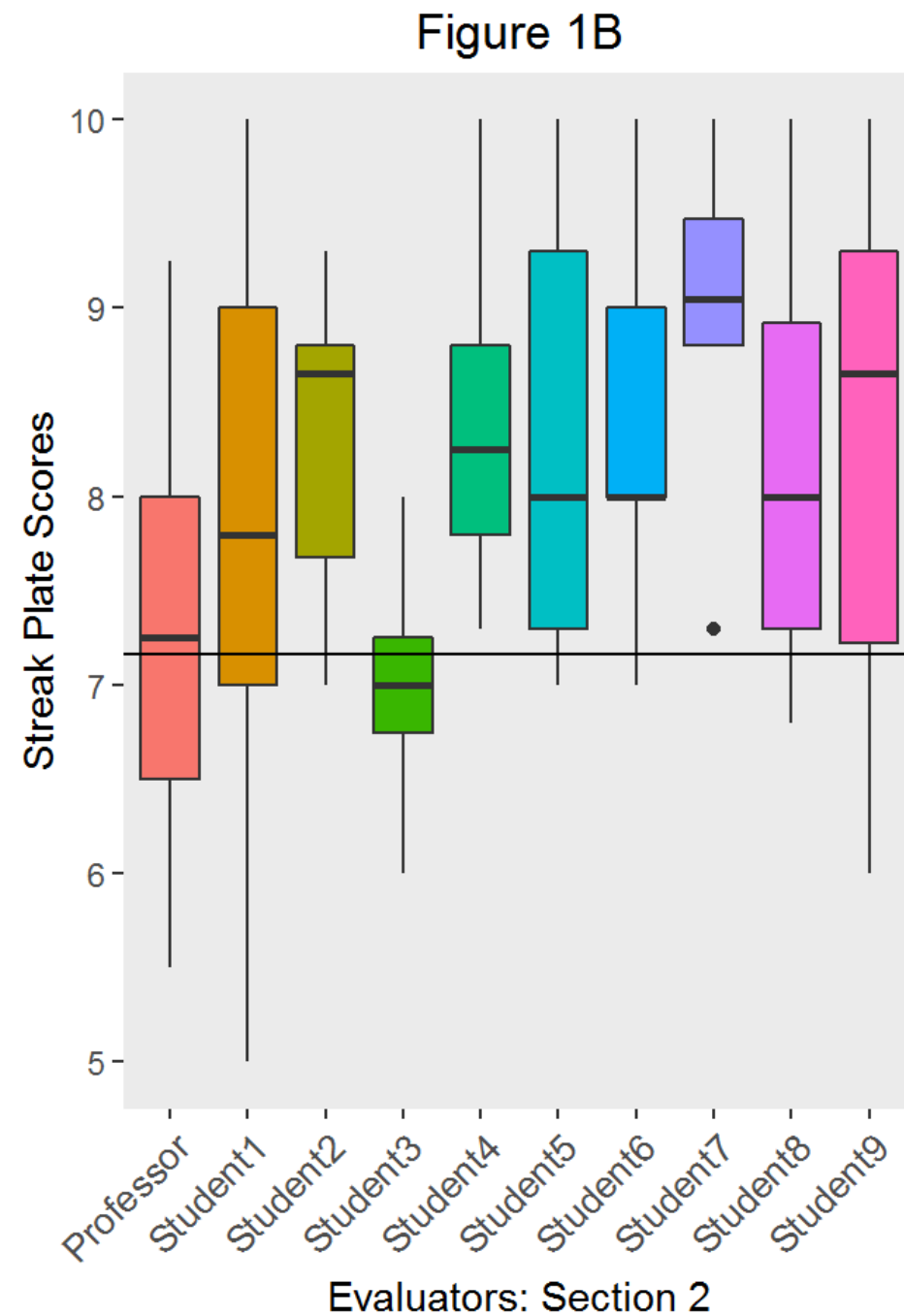
# Interpretation Practice

Hubo una mayor cantidad de estudiantes por debajo del promedio del profesor.

Un minimo de estudiantes sobrepaso el promedio del profesor.



# Interpretation Practice



# Interpretation Practice

Figure 1A

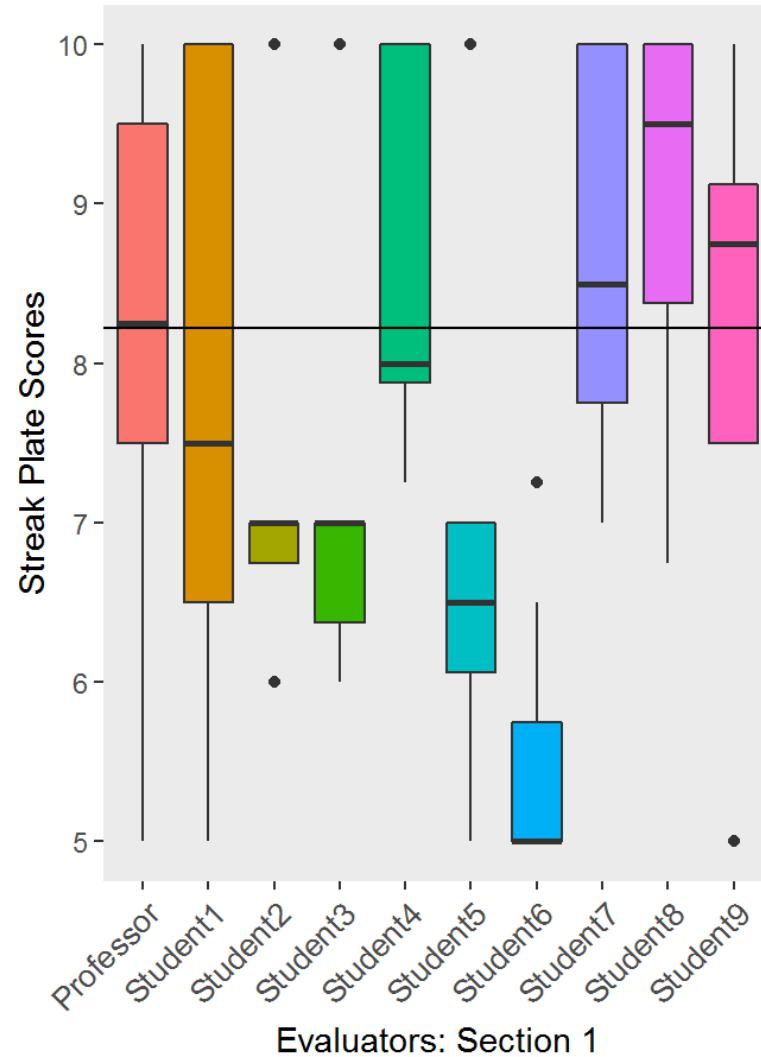
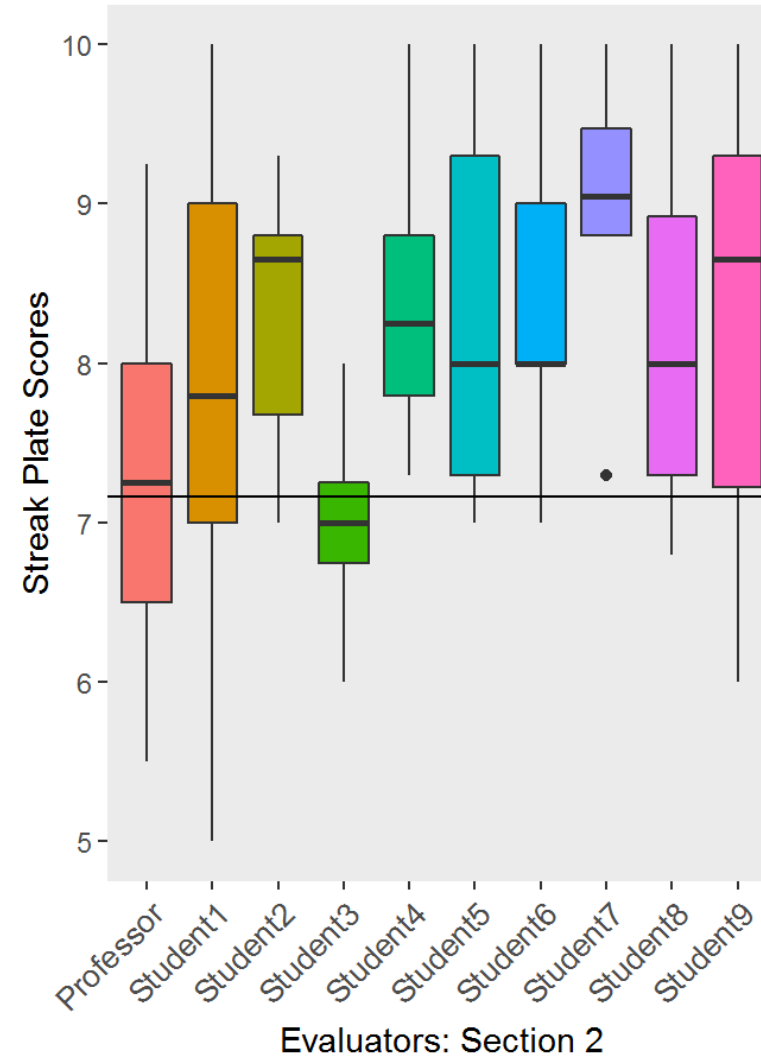
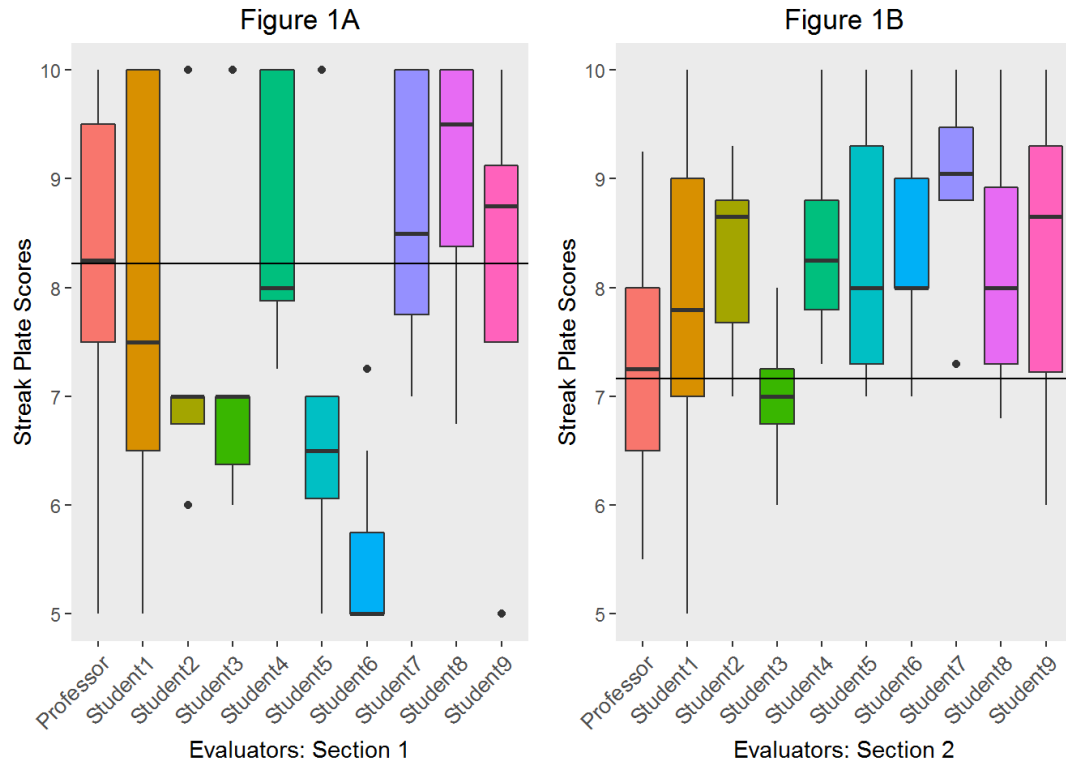


Figure 1B



# Interpretation Practice



- La mayoría del grupo 1 estuvo por debajo del **promediod de evaluacion** del profesor, mientras que el grupo 2 estuvo principalmente por encima del **promedio** de evaluacion del profesor.