Negative Incentive Framing Structures in Cognitively Demanding Tasks

Tshering Wangchuk and Franco Salinas Meza

```
##   Gender == "Female" n
## 1            FALSE 8
## 2             TRUE 7

## [1] Gender == "Female" n
## <0 rows> (or 0-length row.names)
```
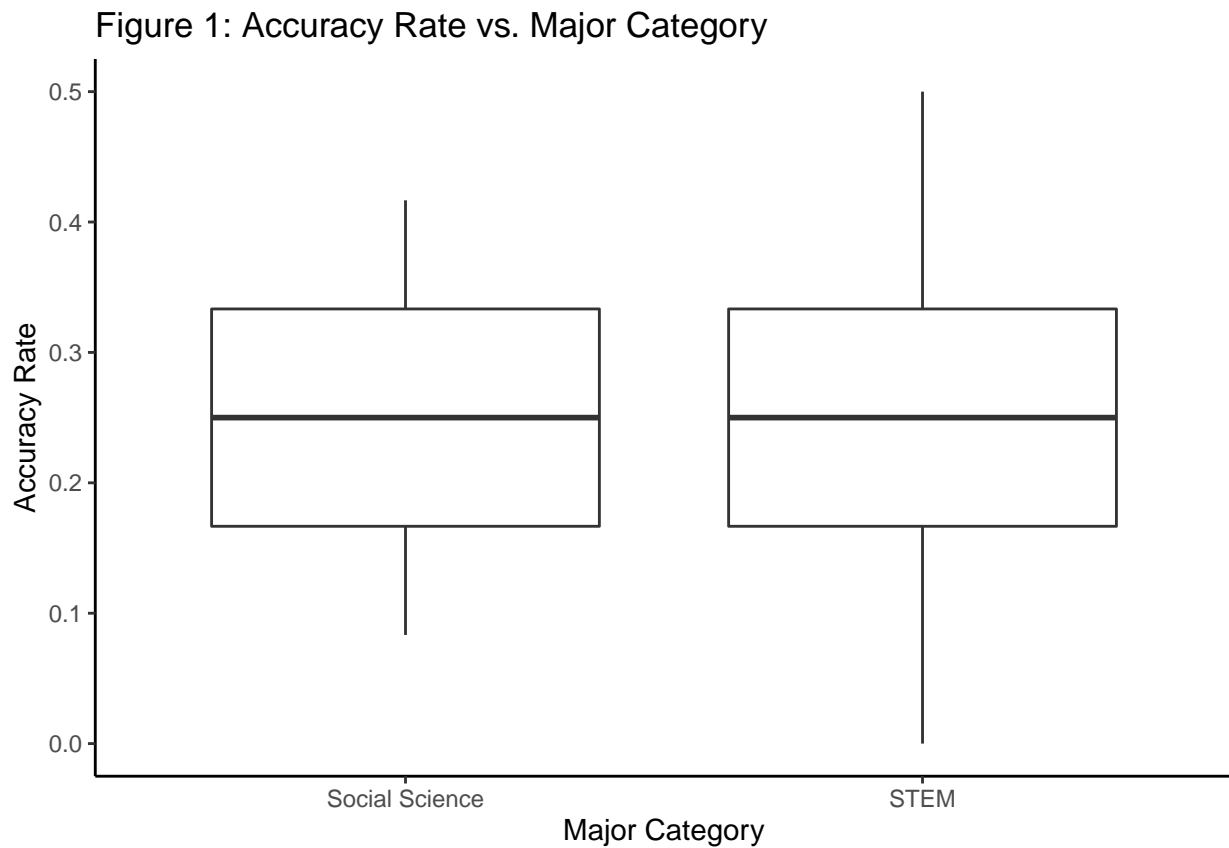

Figure 1: Accuracy Rate vs. Major Category
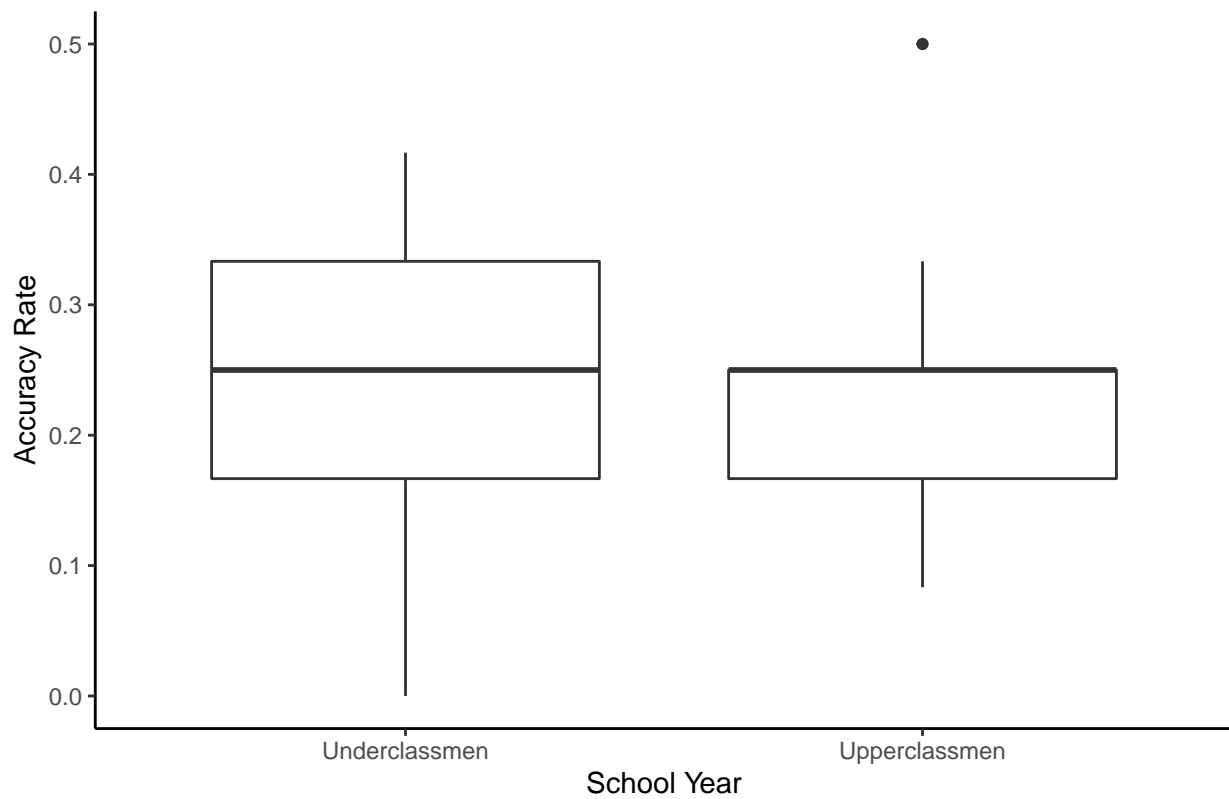
Figure 2: Accuracy Rate vs. School Year

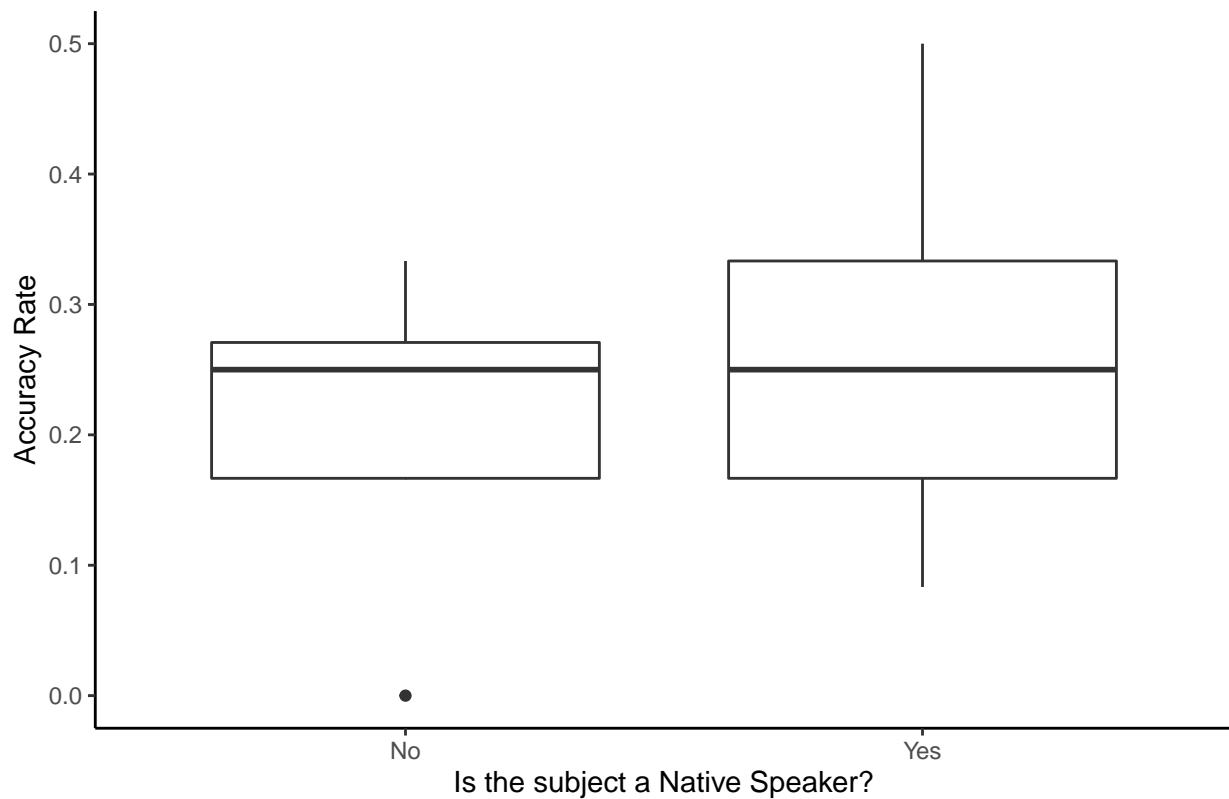Figure 2: Accuracy Rate vs. Indicator of whether the Person is a Native Spe
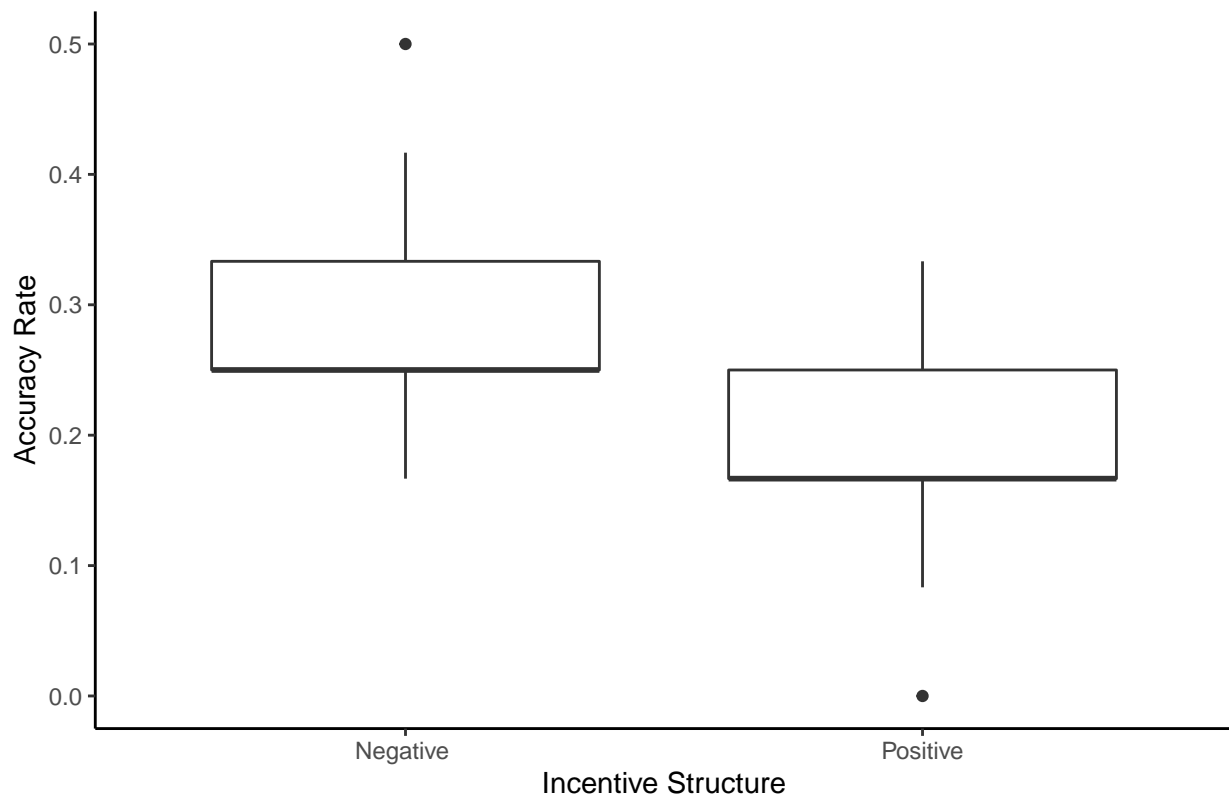
Figure 2: Accuracy Rate vs. Incentive Structure
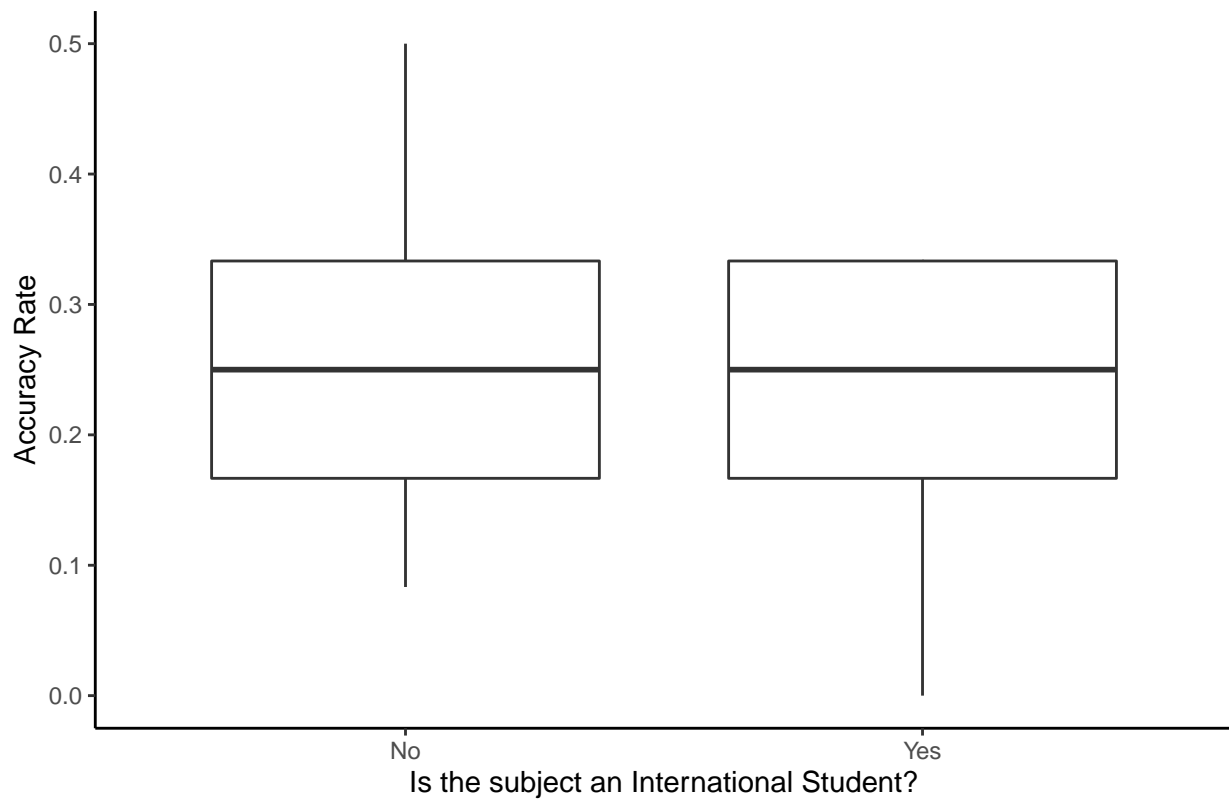

Figure 2: Accuracy Rate vs. Indicator if it's an international Student

Changes in accuracy rate with Number of Guesses

Changes in accuracy rate with Hours of Sleep

Changes in accuracy rate with Number of Classes
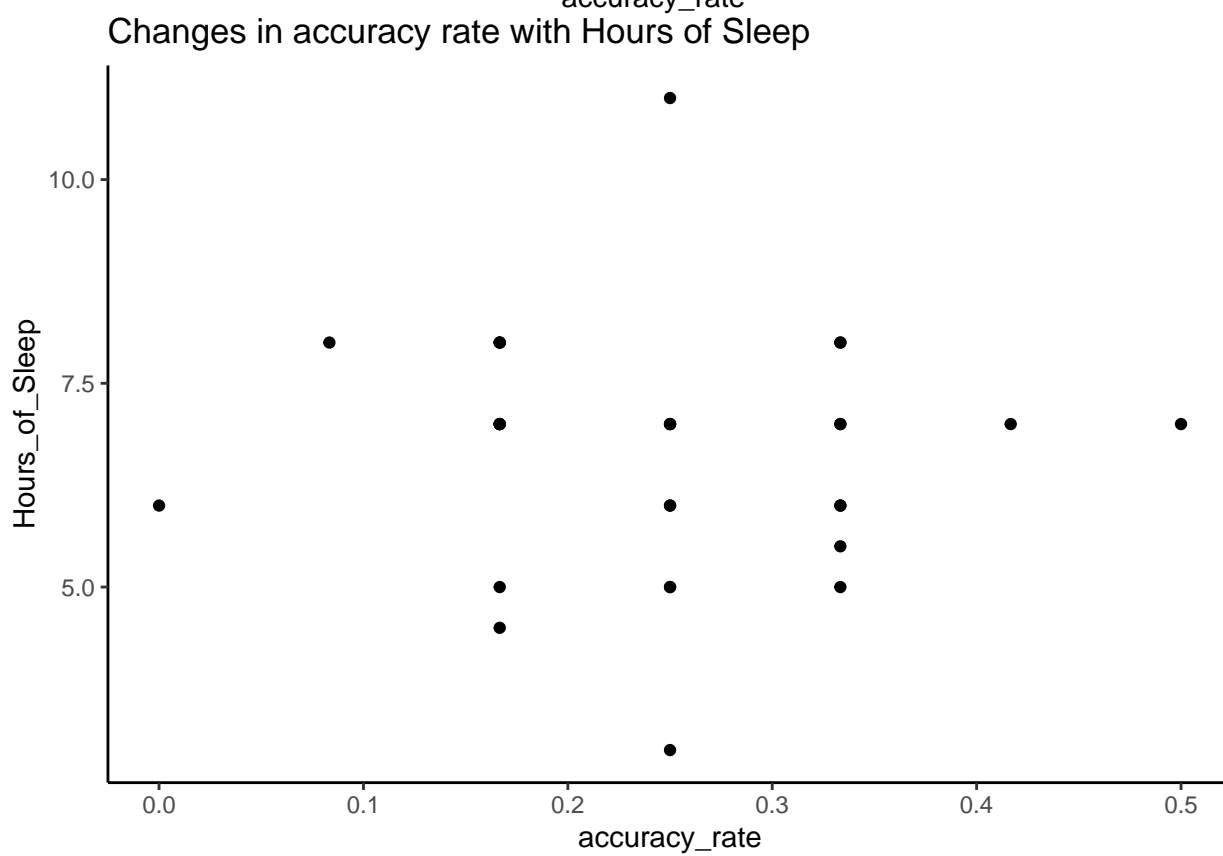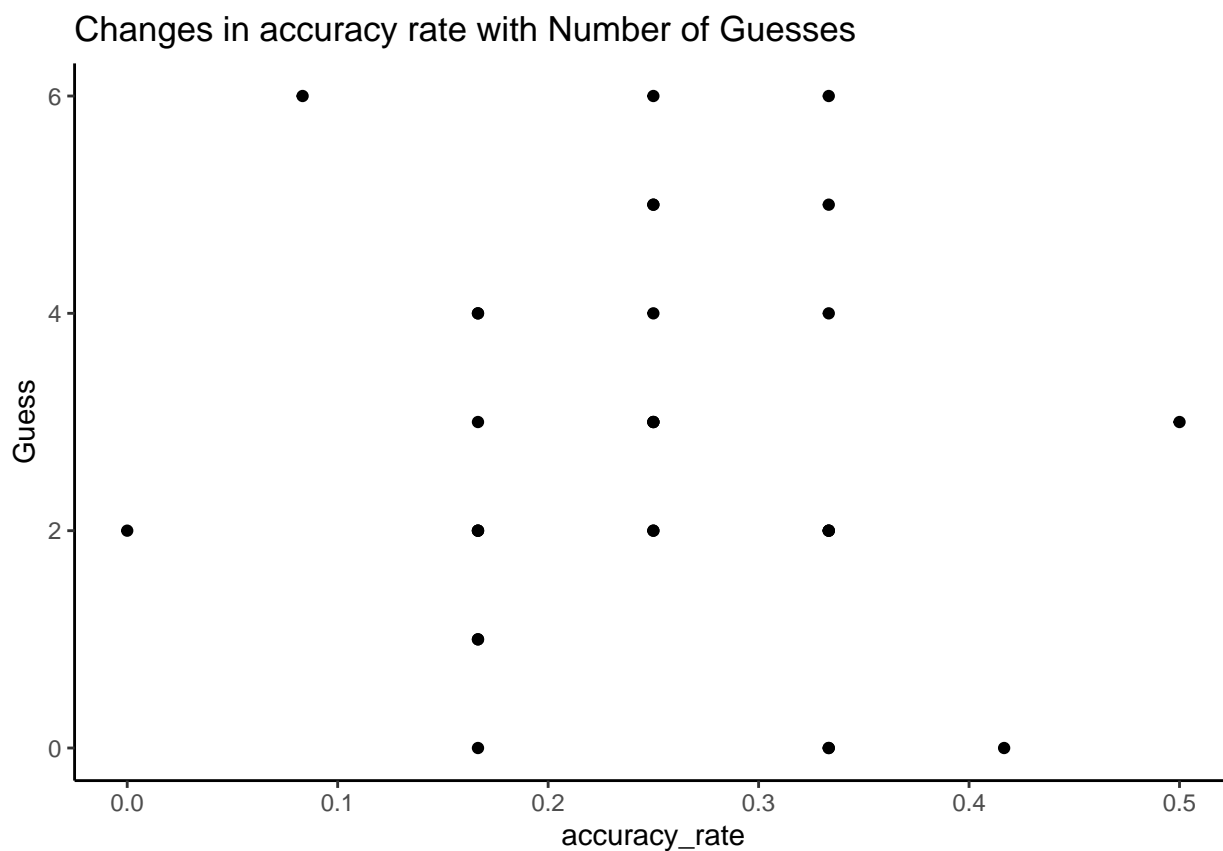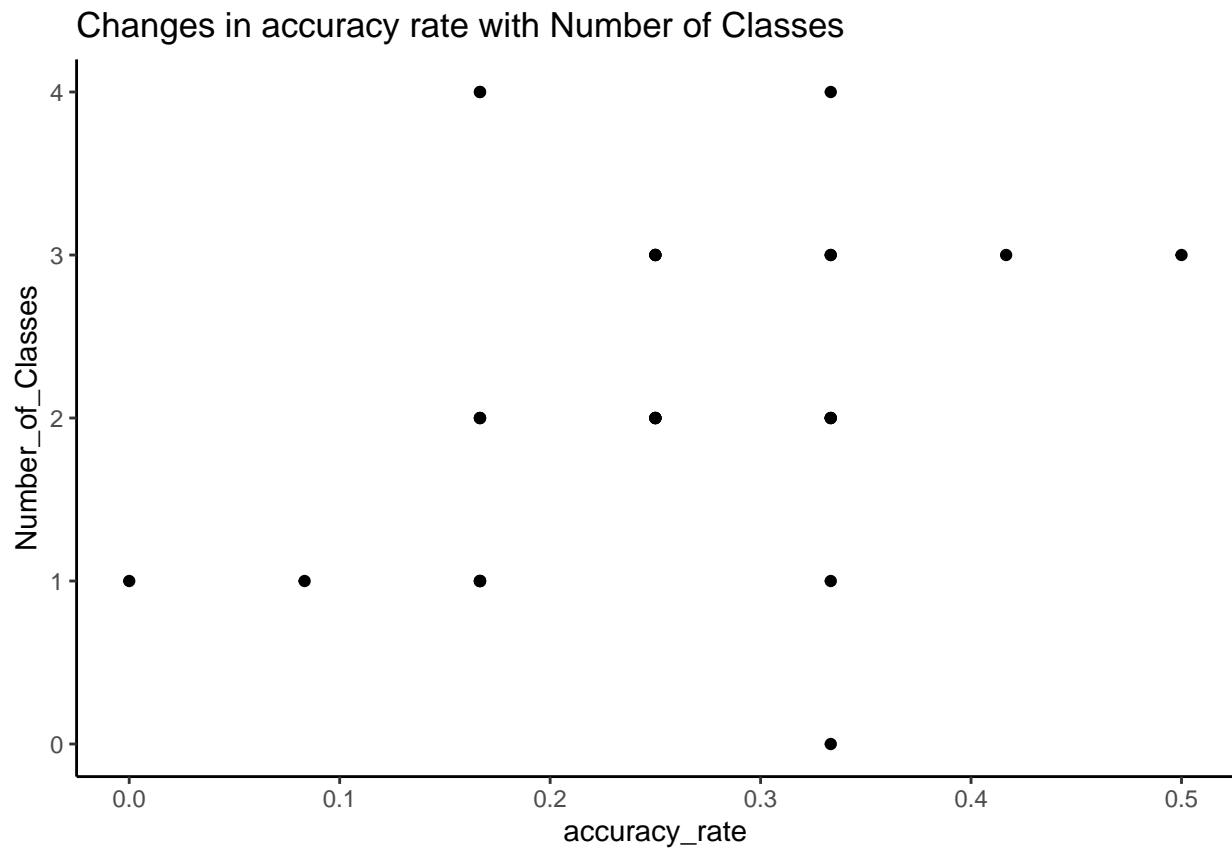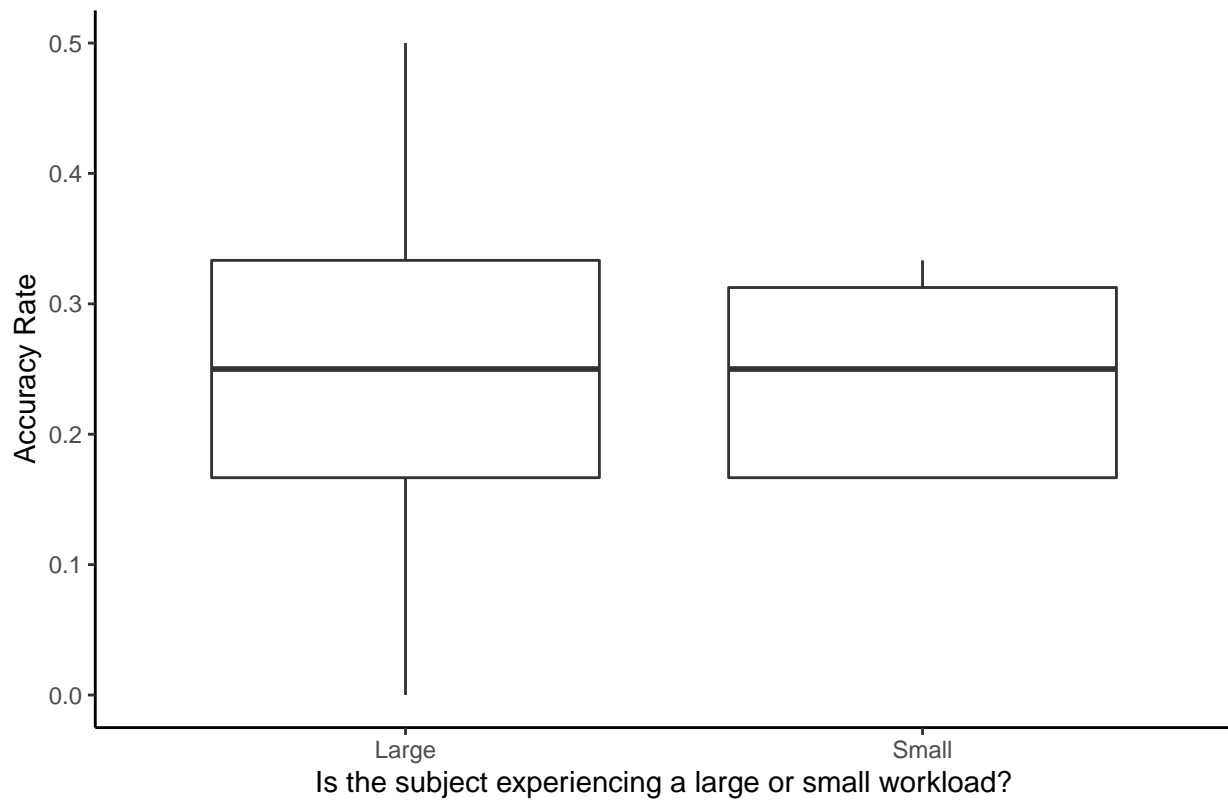

Figure 2: Accuracy Rate vs. Workload
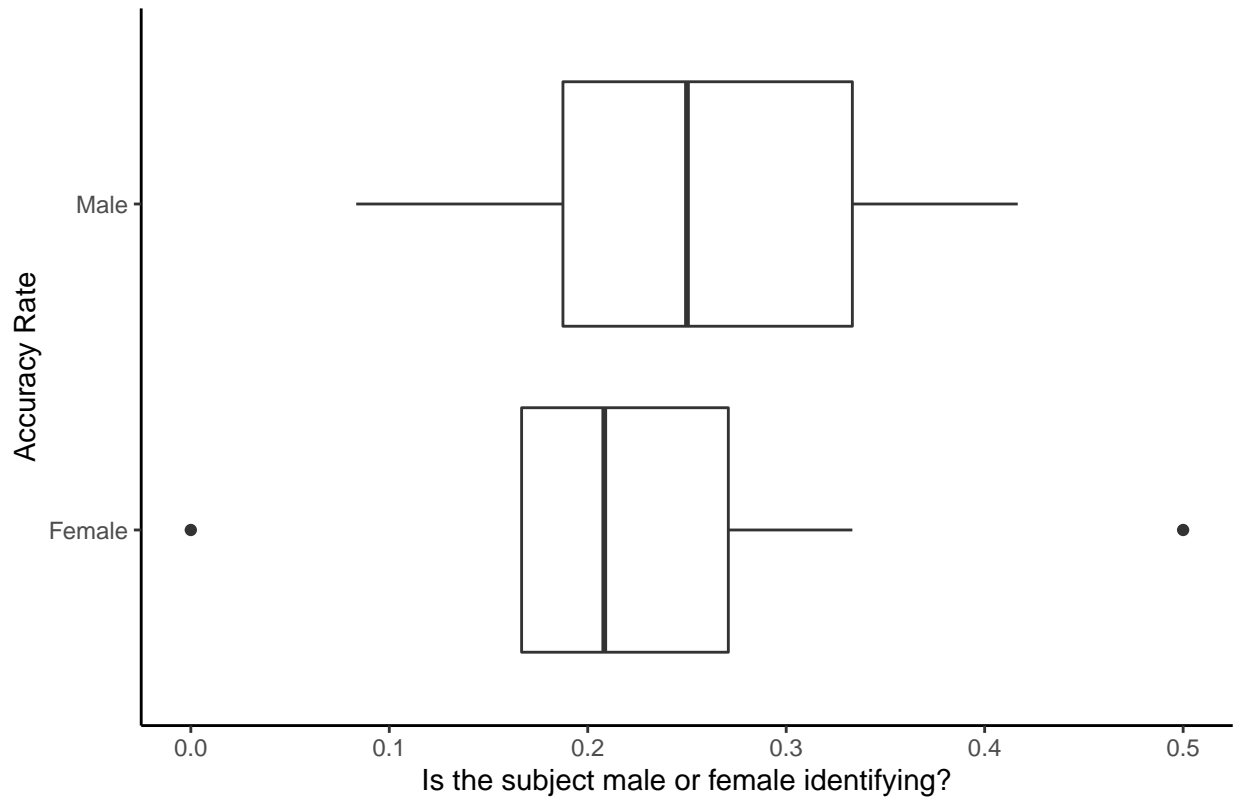
Figure 2: Accuracy Rate vs. Indicator for Gender

Figure 2: Share of Questions Responded vs. Incentive Structure
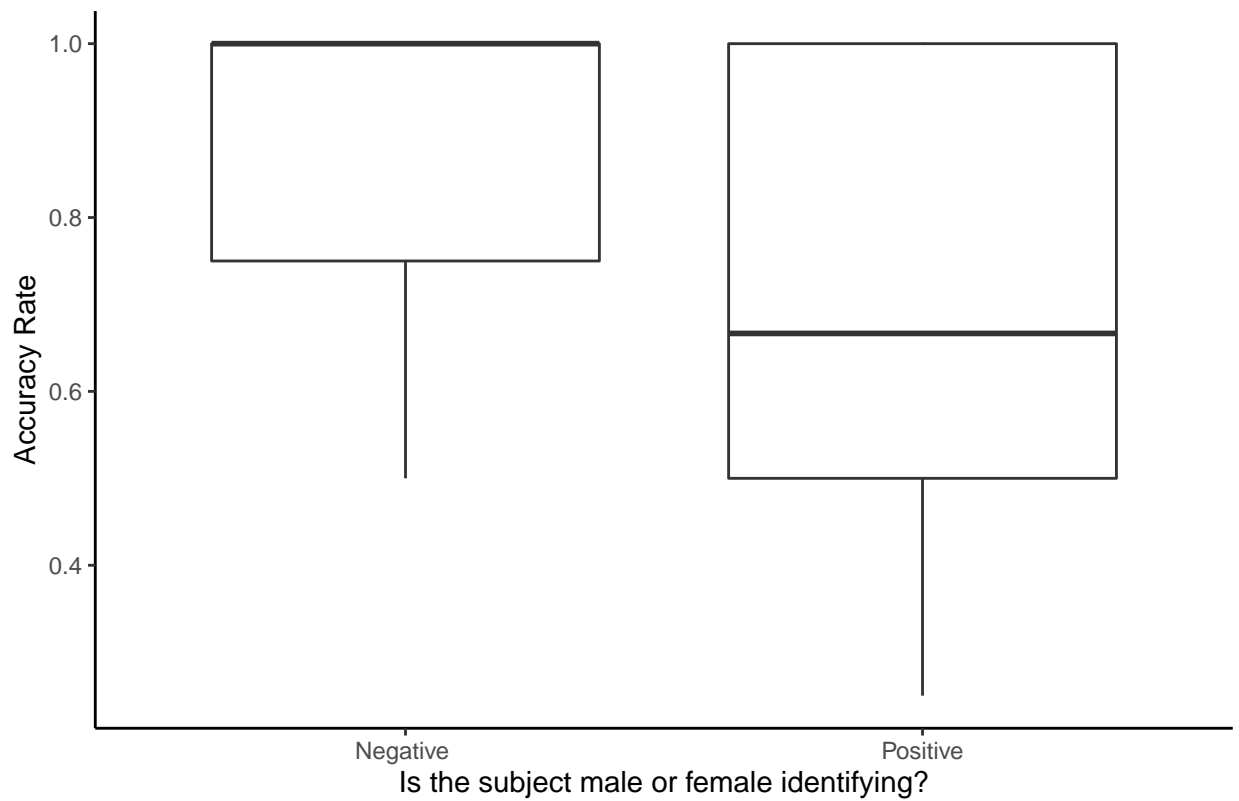
Figure 2: Distribution of Share of Questions Responded
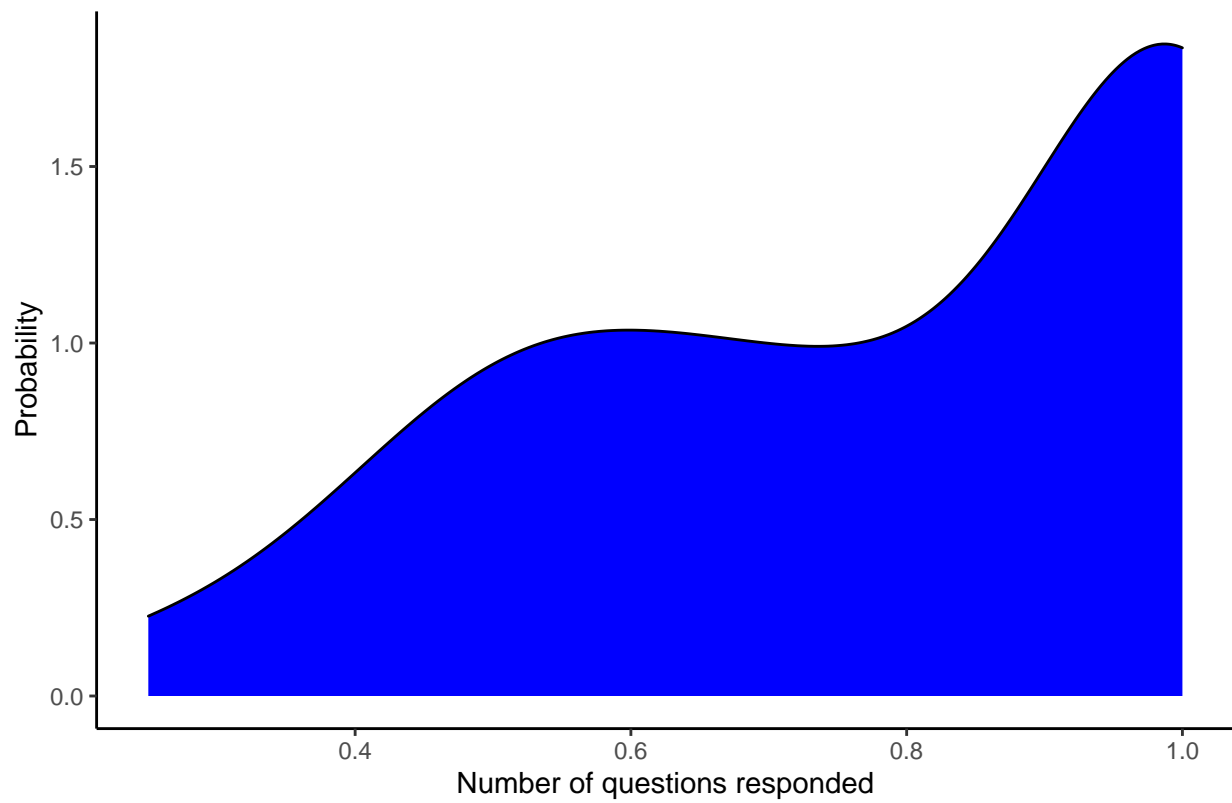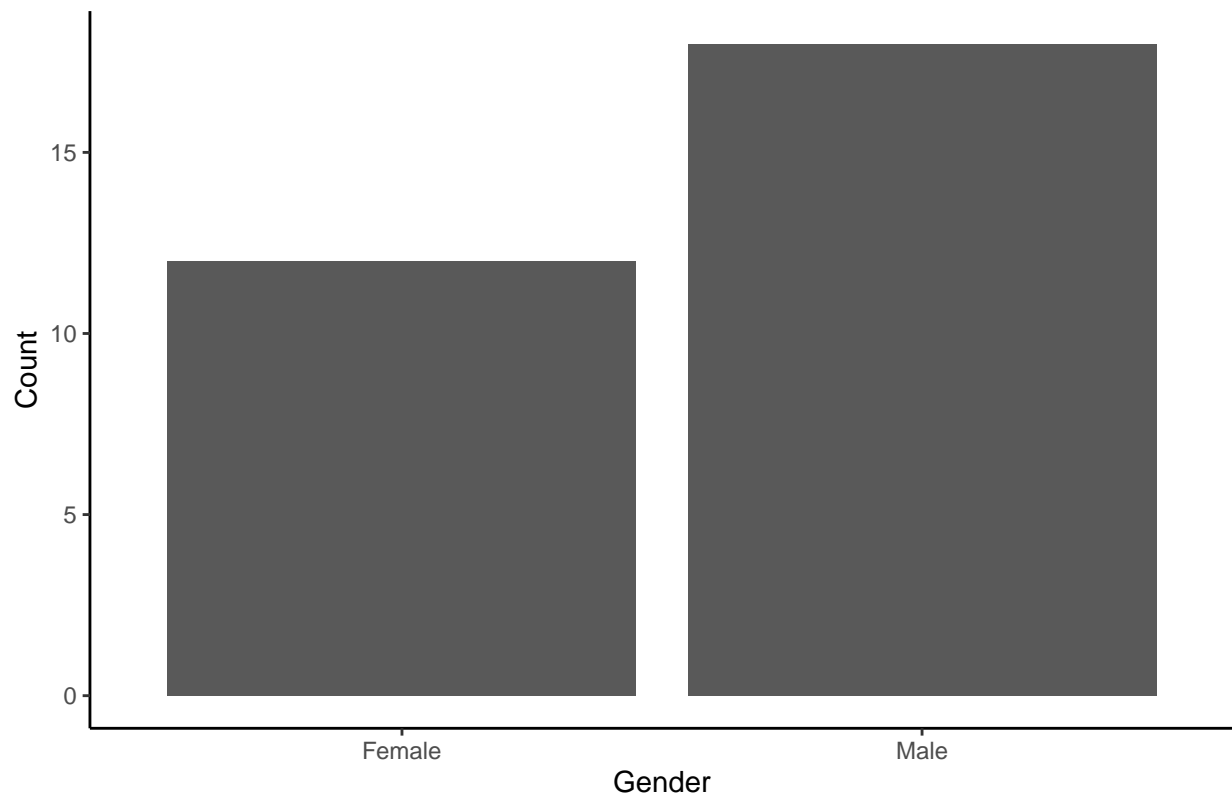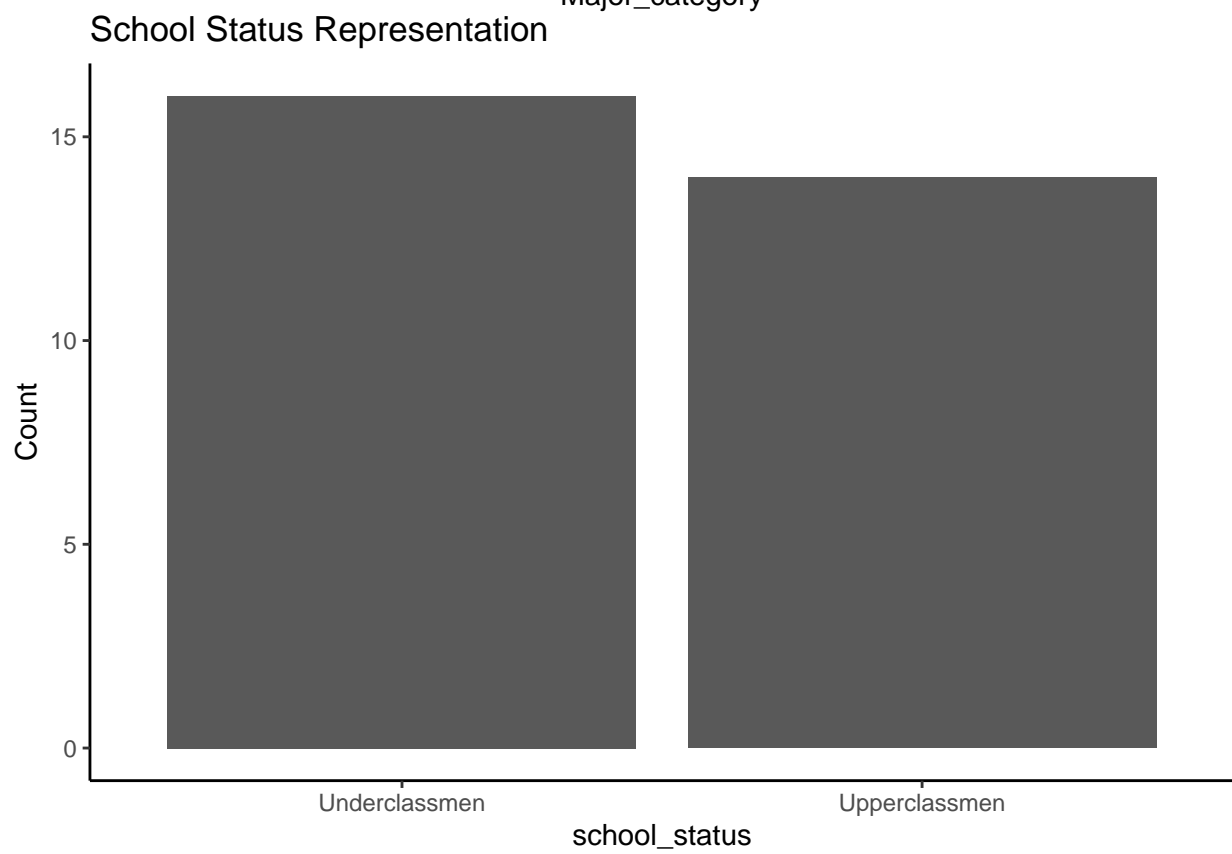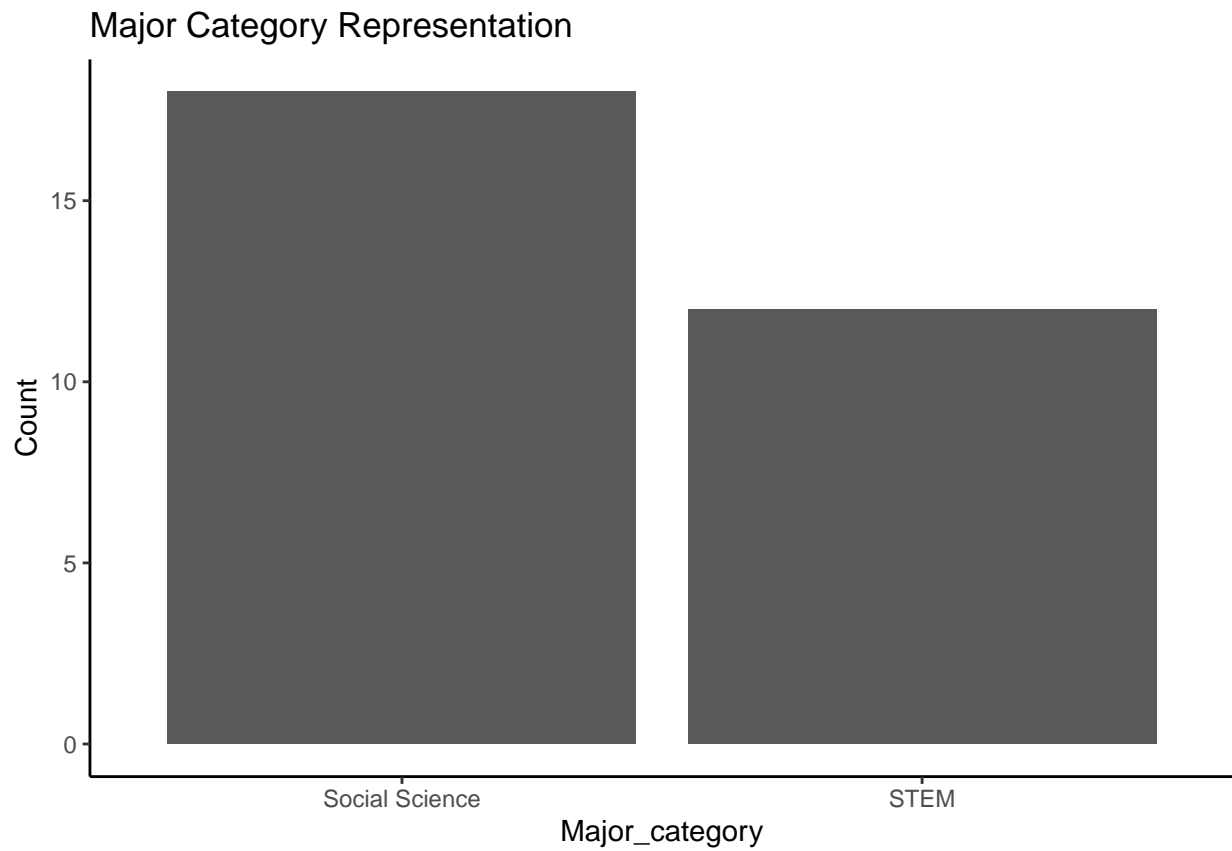

Gender Representation

Major Category Representation

School Status Representation

Representation of Native English Speakers

Representation of International Students

Representation of both Incentive Structures
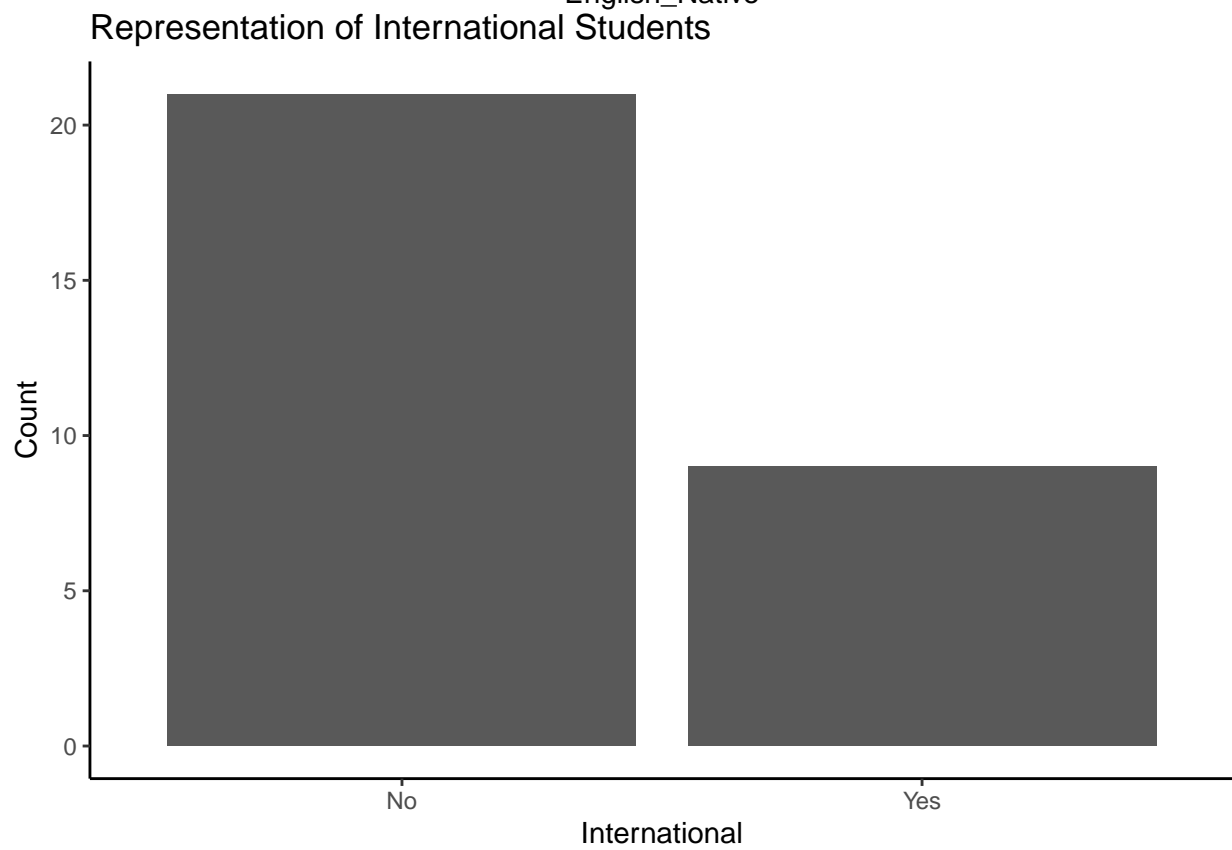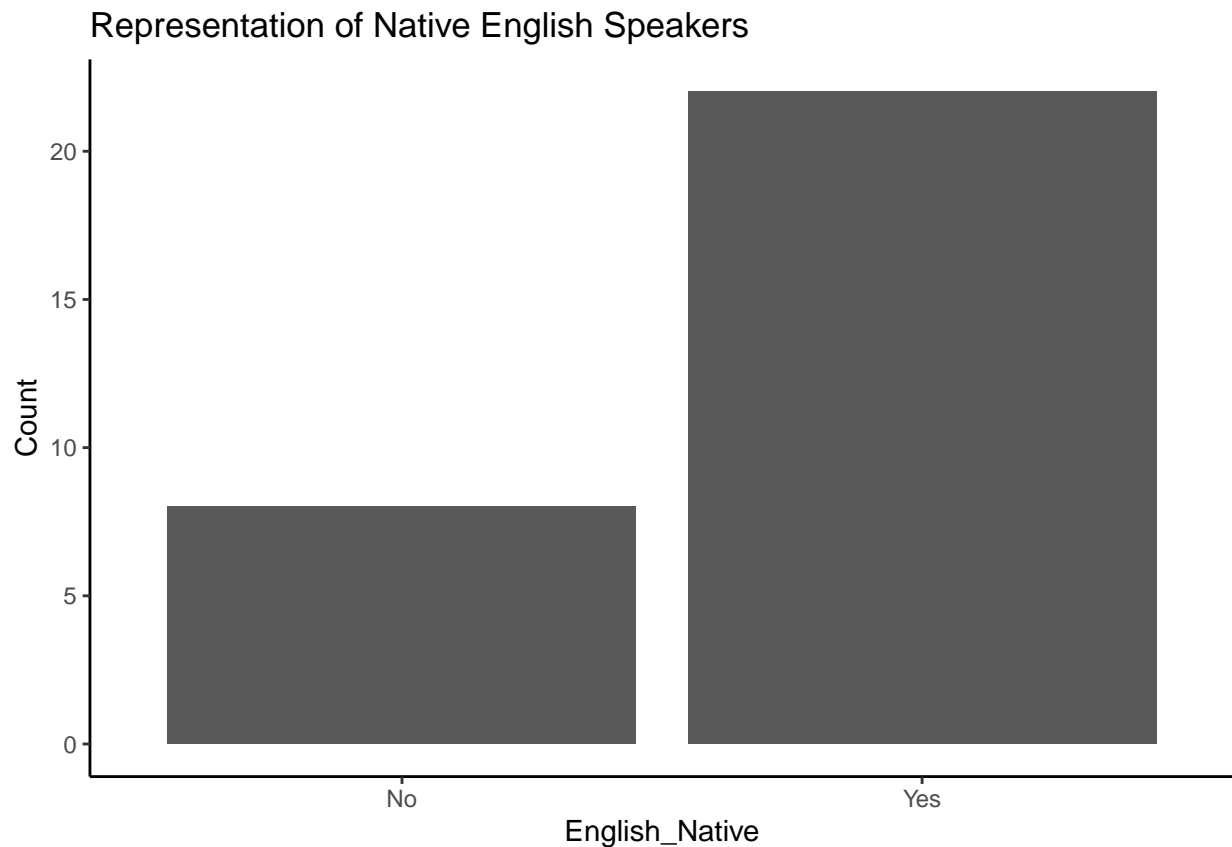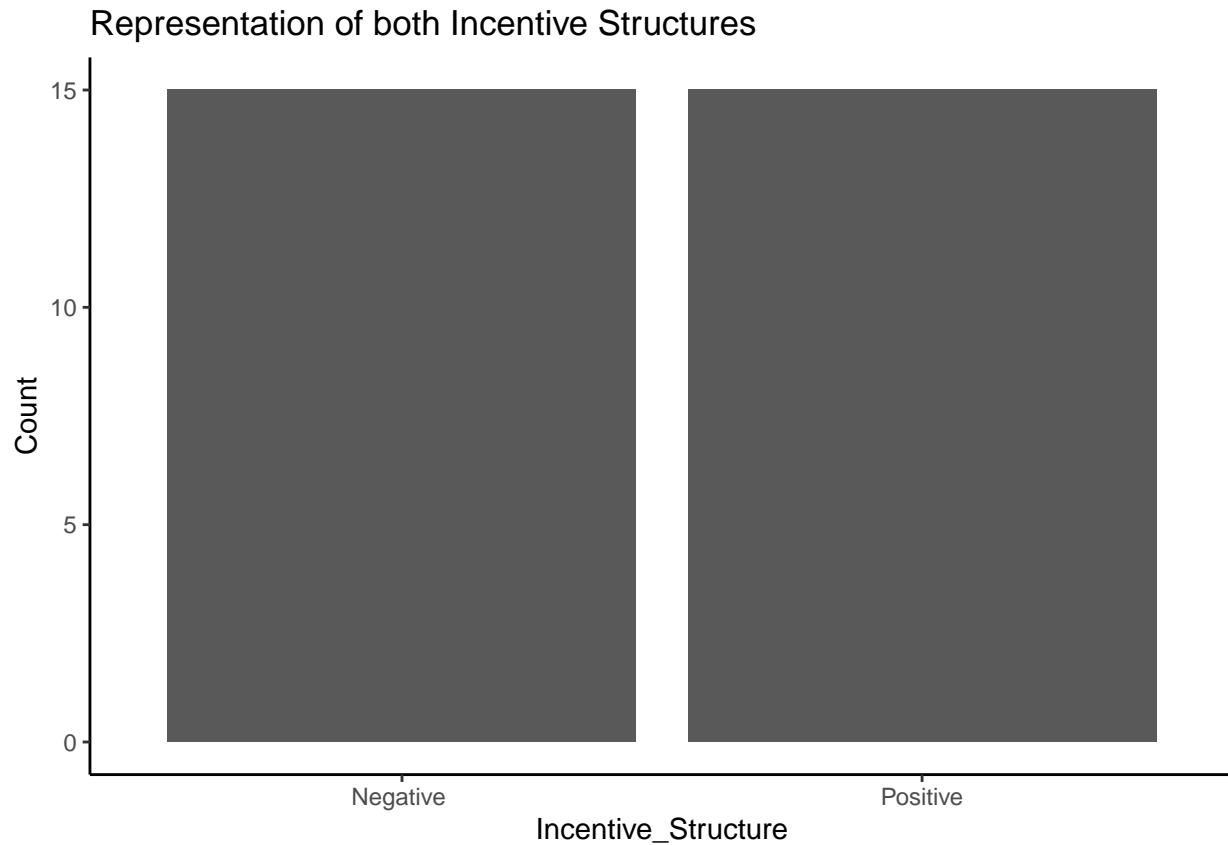

```
##                              accuracy_rate      Gender Number_of_Classes
## accuracy_rate                  1.00000000 -0.1478227        0.31016591
## Gender                        -0.14782275  1.0000000       -0.33926581
## Number_of_Classes              0.31016591 -0.3392658        1.00000000
## share_questions_responded      0.40553031 -0.2254090        0.32118893
## English_Native                 0.17215953 -0.1230915        0.25056441
## Incentive_Structure           -0.41779650  0.1360828       -0.16620562
## Guess                         -0.06580809 -0.2526234        0.03739919
##                              share_questions_responded English_Native
## accuracy_rate                                0.4055303      0.1721595
## Gender                                      -0.2254090     -0.1230915
## Number_of_Classes                            0.3211889      0.2505644
## share_questions_responded                    1.0000000      0.4198079
## English_Native                               0.4198079      1.0000000
## Incentive_Structure                         -0.3240804     -0.1507557
## Guess                                        0.2943960      0.2713814
##                              Incentive_Structure      Guess
## accuracy_rate                         -0.4177965 -0.06580809
## Gender                                 0.1360828 -0.25262337
## Number_of_Classes                     -0.1662056  0.03739919
## share_questions_responded             -0.3240804  0.29439601
## English_Native                        -0.1507557  0.27138141
## Incentive_Structure                    1.0000000 -0.22501758
## Guess                                 -0.2250176  1.00000000
```

Insights:

Model 1: Criteria(correlation larger than 0.1 or smaller than -0.1), I realized that variables with correlation that is lower than 0.3 or larger than -0.3 didn't have an important impact on the model.

```
Gender
Number_of_Classes
share_questions_responded
English_Native
Incentive_Structure
Guess
```

Understanding Factors that affect accuracy

Notes: English native increased our p value by a lot Gender increased by a little Number of classes incrased p value by a lot

$$E[\text{Accuracy Rate}] = \beta_0 + \beta_1 * \text{Incentive Structure}$$

$E[\text{Accuracy Rate}] = \beta_0 + \beta_1 * \text{Incentive Structure} + \beta_2 * \text{Gender} + \beta_3 * \text{Number of Classes} + \beta_4 * \text{Share of Questions Responded} + \beta_5$
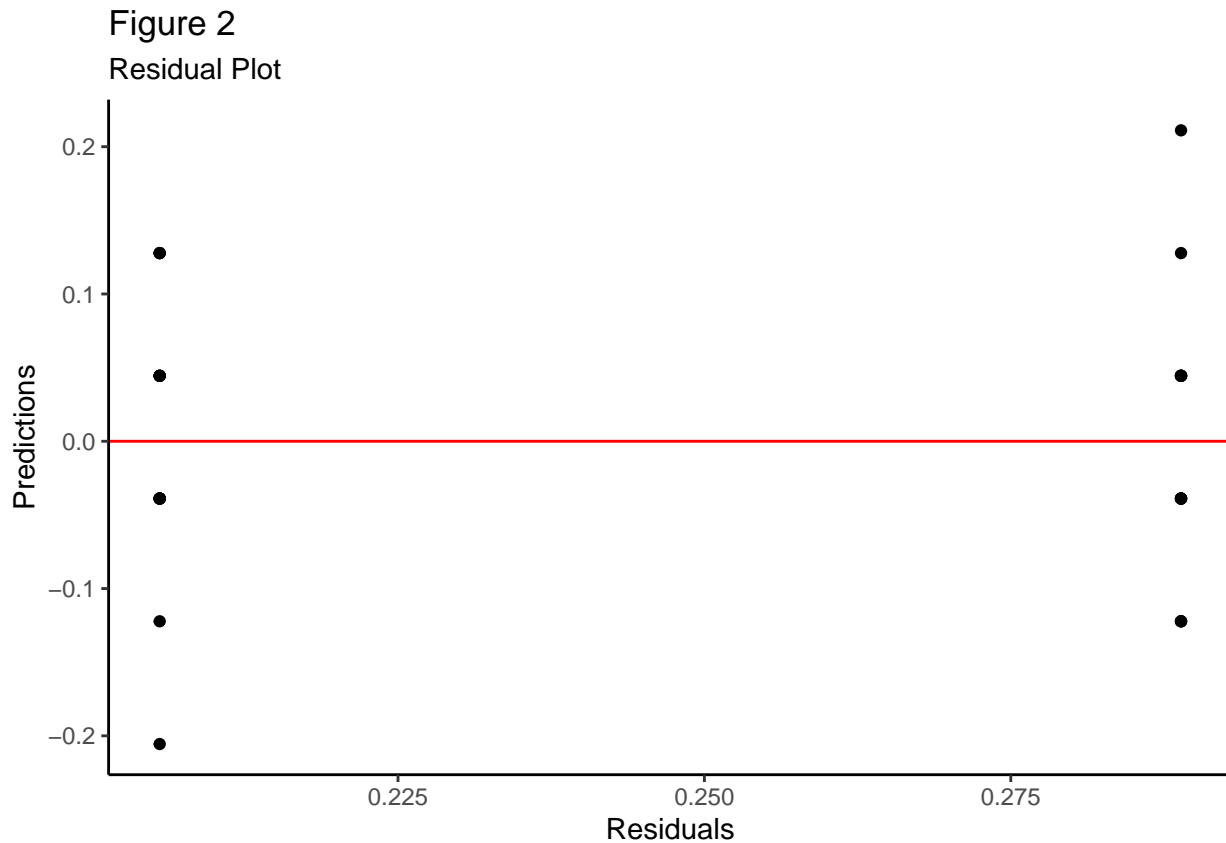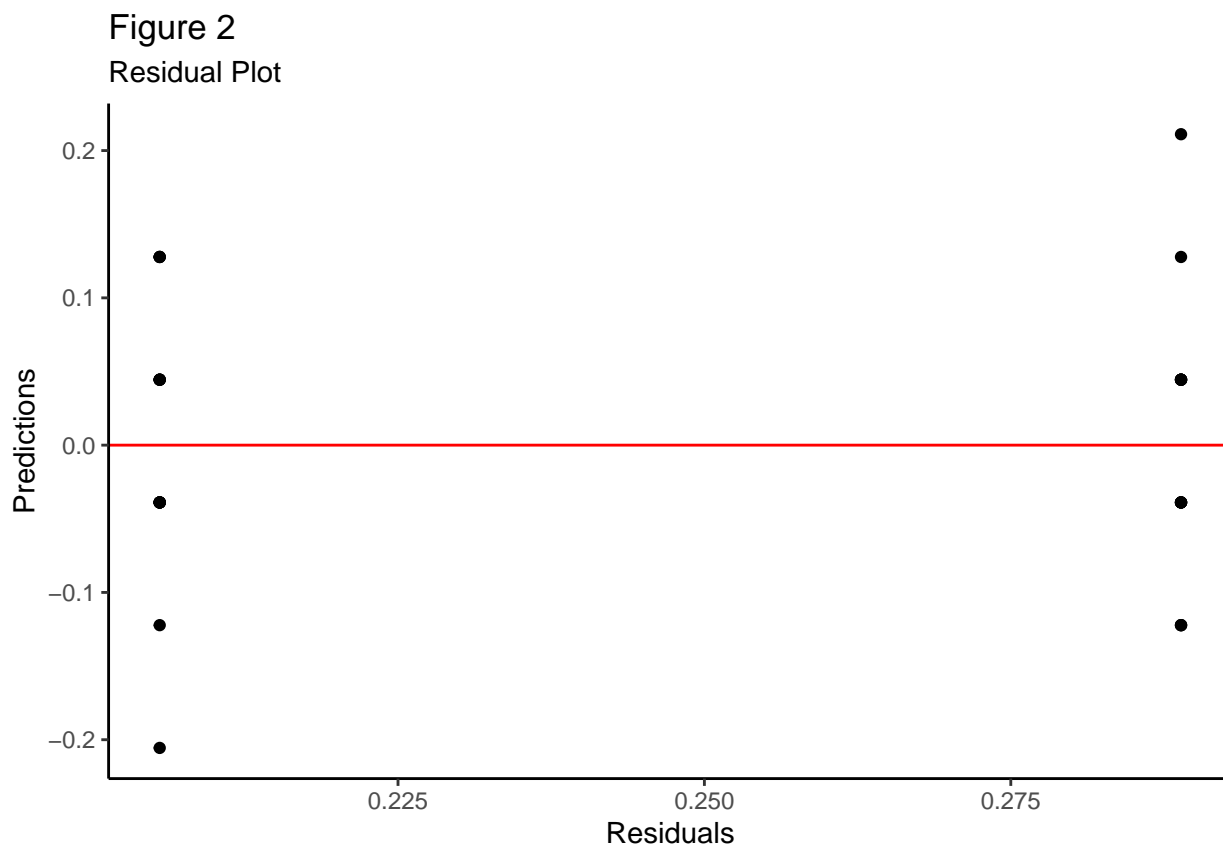
Figure 2

Residual Plot

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Figure 2
Residual Plot

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Fri, Apr 29, 2022 - 17:08:32

Table 1: Share of correct answers and Controls

|	*Dependent variable:*					
	Share of correct answers					
	(1)	(2)	(3)	(4)	(5)	(6)
Positive Incentive Structure	−0.068*	−0.062	−0.061*	−0.075**	−0.081**	−0.083**
	(0.036)	(0.037)	(0.036)	(0.035)	(0.035)	(0.034)
Gender Male	0.009	−0.003	−0.003	0.003	0.019	
	(0.038)	(0.038)	(0.037)	(0.037)	(0.036)	
Number of Classes	0.014	0.019	0.018	0.024		
	(0.019)	(0.019)	(0.019)	(0.018)		
Share of questions responded	0.131	0.112	0.108			
	(0.088)	(0.088)	(0.081)			
Native English Speaker	0.005	−0.007				
	(0.043)	(0.043)				
Number of Guesses	−0.014					
	(0.011)					
(Intercept)	0.178**	0.156**	0.155**	0.231***	0.276***	0.289***
	(0.076)	(0.075)	(0.074)	(0.048)	(0.034)	(0.024)
Observations	30	30	30	30	30	30
R^2	0.339	0.286	0.285	0.234	0.183	0.175
Adjusted R^2	0.166	0.137	0.171	0.146	0.122	0.145
Residual Std. Error	0.093 (df = 23)	0.094 (df = 24)	0.092 (df = 25)	0.094 (df = 26)	0.095 (df = 27)	0.094 (df = 28)
F Statistic	1.962 (df = 6; 23)	1.919 (df = 5; 24)	2.490* (df = 4; 25)	2.652* (df = 3; 26)	3.024* (df = 2; 27)	5.921** (df = 1; 28)

Note: *p<0.1; **p<0.05; ***p<0.01
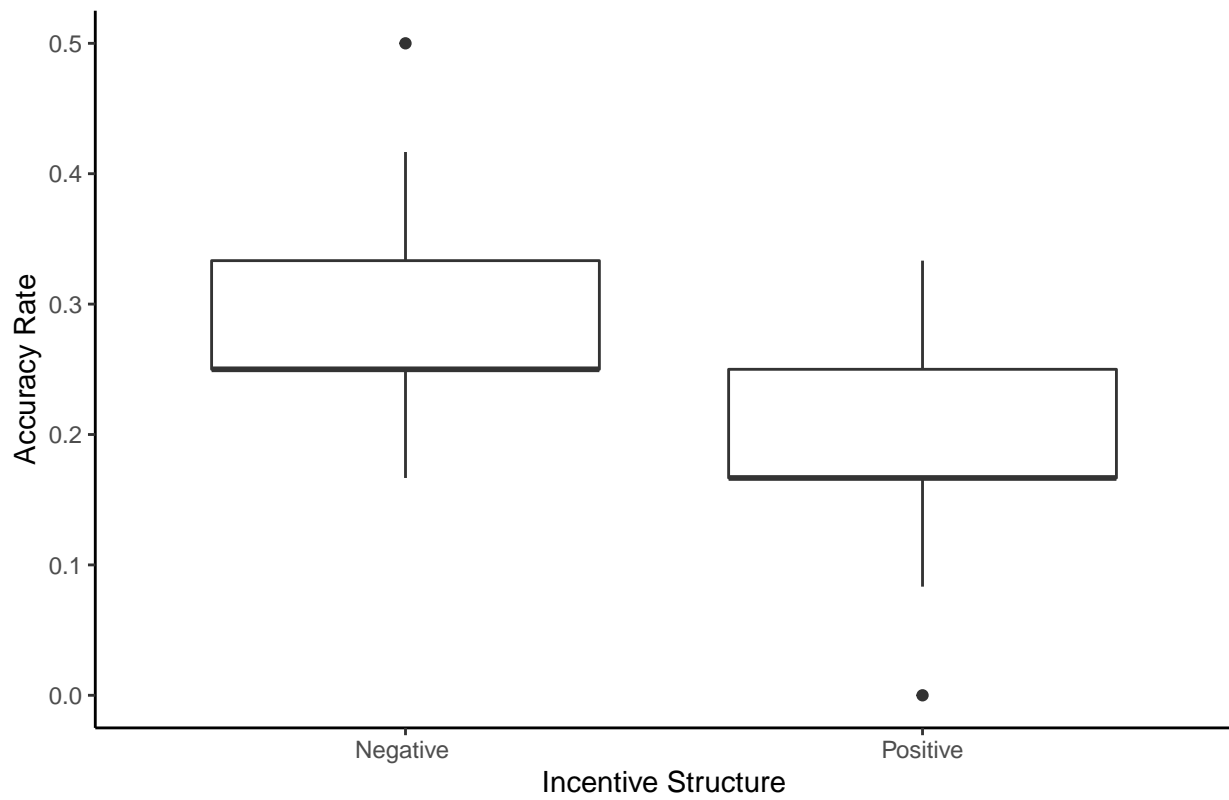
Figure 2: Accuracy Rate vs. Incentive Structure
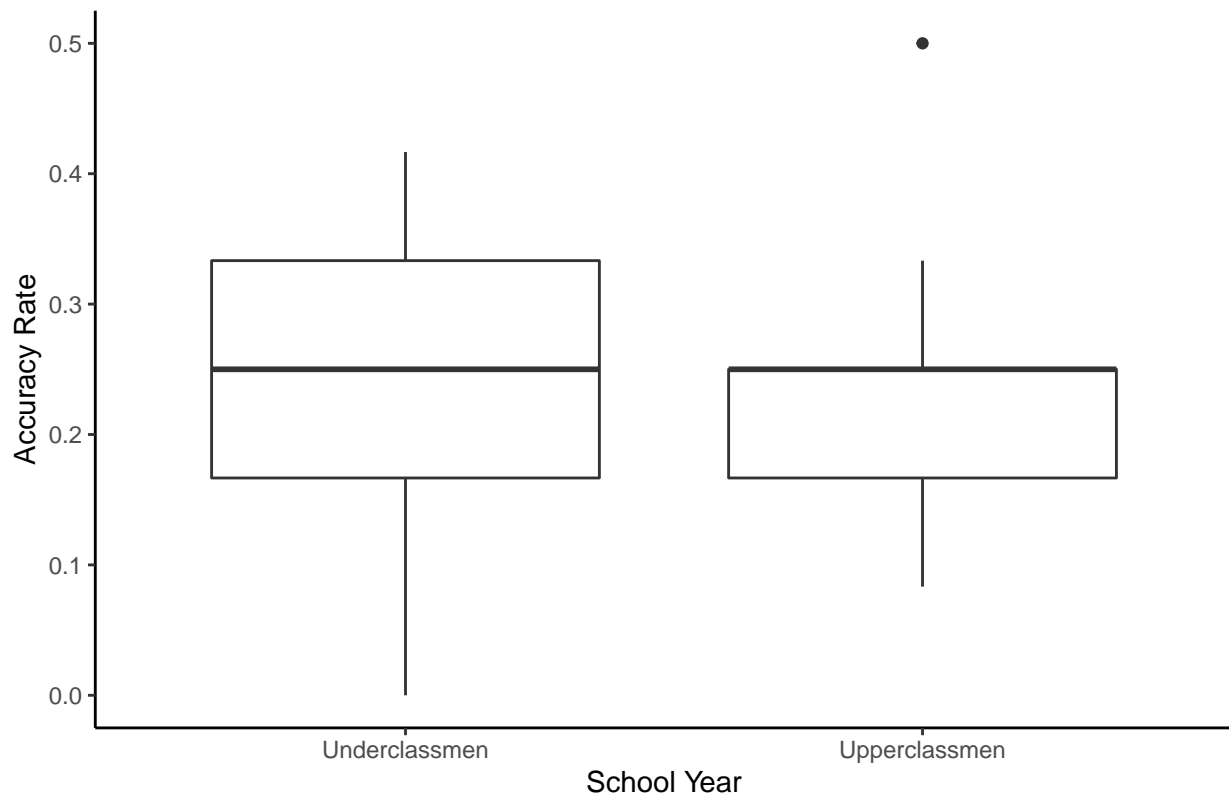
Figure 2: Accuracy Rate vs. School Year

Figure 2: Accuracy Rate vs. Indicator of whether the Person is a Native Spe
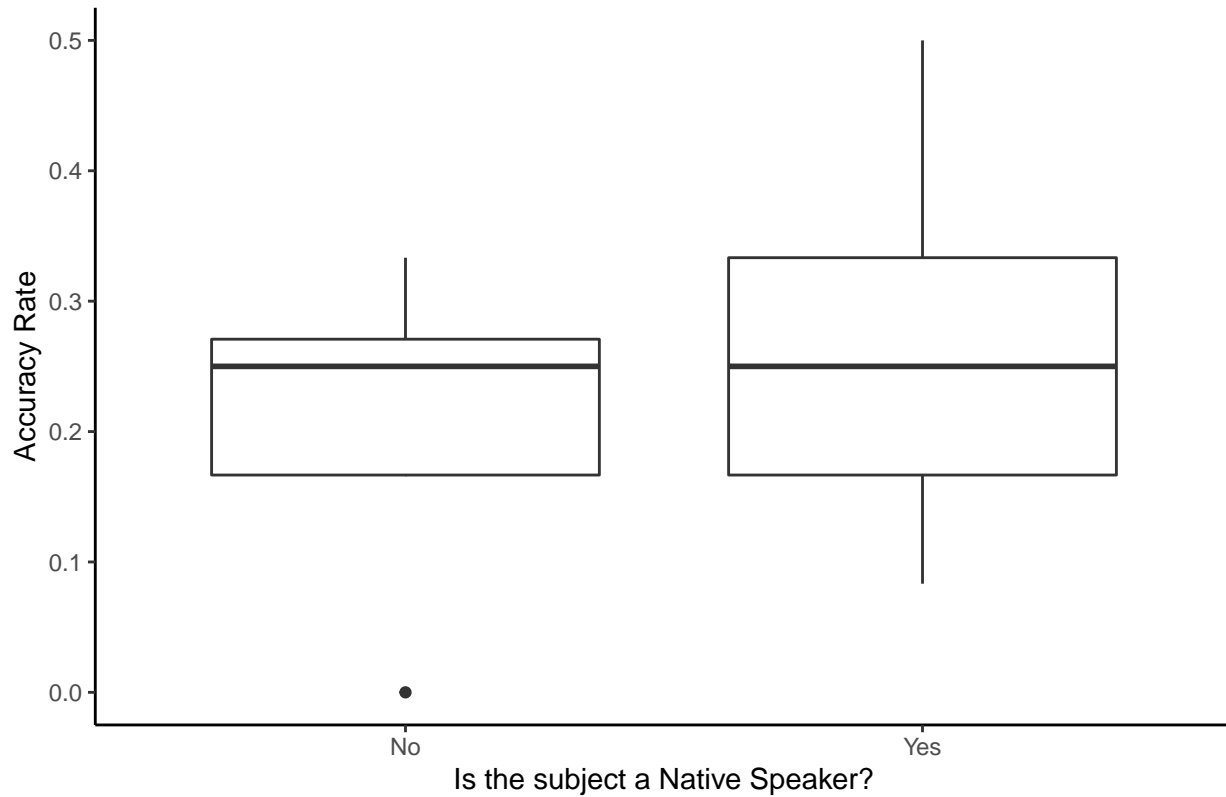
Understanding Factors that affect the share of questions responded:

```
##                         share_questions_responded accuracy_rate
## share_questions_responded             1.0000000     0.40553031
## accuracy_rate                         0.4055303     1.00000000
## English_Native                        0.4198079     0.17215953
## International                        -0.4164630    -0.10332676
## Incentive_Structure                  -0.3240804    -0.41779650
## Workload                             -0.6026044     0.03939023
## Gender                               -0.2254090    -0.14782275
##                         English_Native International Incentive_Structure
## share_questions_responded      0.4198079    -0.4164630          -0.3240804
## accuracy_rate                  0.1721595    -0.1033268          -0.4177965
## English_Native                 1.0000000    -0.5921565          -0.1507557
## International                 -0.5921565     1.0000000          -0.0727393
## Incentive_Structure           -0.1507557    -0.0727393           1.0000000
## Workload                      -0.2665009     0.4629100          -0.1414214
## Gender                        -0.1230915     0.2078699           0.1360828
##                            Workload        Gender
## share_questions_responded -6.026044e-01 -2.254090e-01
## accuracy_rate              3.939023e-02 -1.478227e-01
## English_Native            -2.665009e-01 -1.230915e-01
## International              4.629100e-01  2.078699e-01
## Incentive_Structure       -1.414214e-01  1.360828e-01
```

```
## Workload                         1.000000e+00 -7.824555e-21
## Gender                          -7.824555e-21  1.000000e+00
```

Accuracy rate English_Native International Workload Incentive structure

$E[\text{Share of Questions Responded}] = \beta_0 + \beta_1 * \text{Accuracy Rate} + \beta_2 * \text{Incentive Structure} + \beta_3 * \text{English Native Speaker} + \beta_4 * \text{Interna}$

```
##
## Call:
## lm(formula = accuracy_rate ~ Incentive_Structure + Gender, data = data_final)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.19549 -0.04707 -0.02757  0.05042  0.22369
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 0.27631    0.03420   8.079 1.11e-08 ***
## Incentive_StructurePositive -0.08082    0.03502  -2.308   0.0289 *
## GenderMale                   0.01887    0.03574   0.528   0.6019
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09502 on 27 degrees of freedom
## Multiple R-squared:  0.183,  Adjusted R-squared:  0.1225
## F-statistic: 3.024 on 2 and 27 DF,  p-value: 0.06533
```
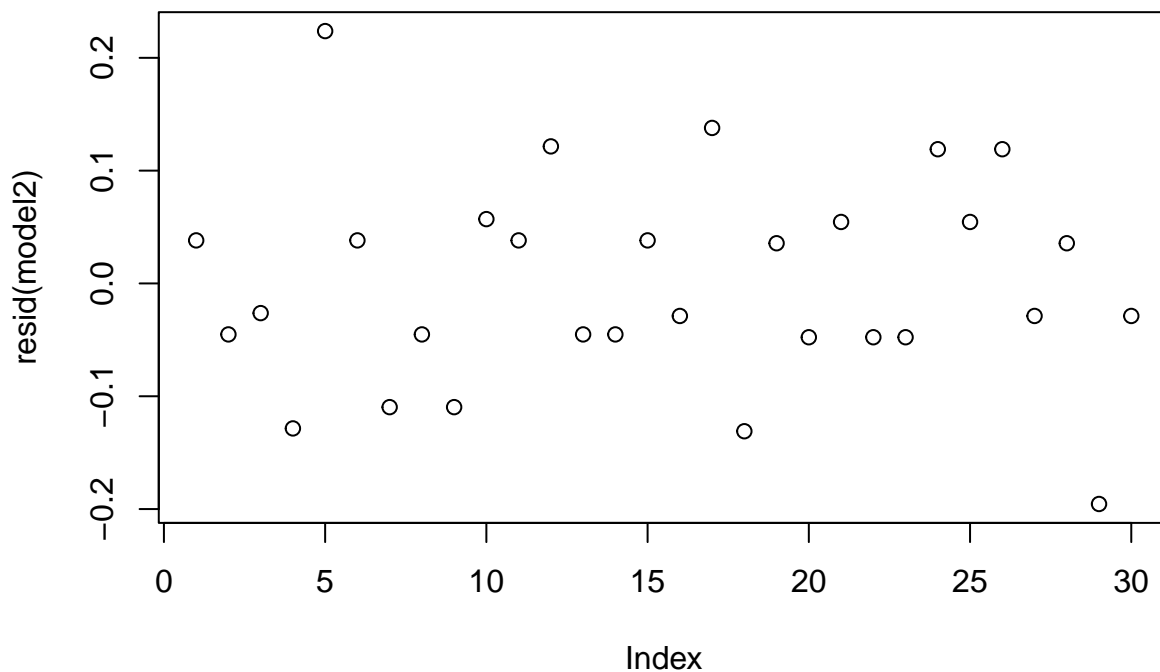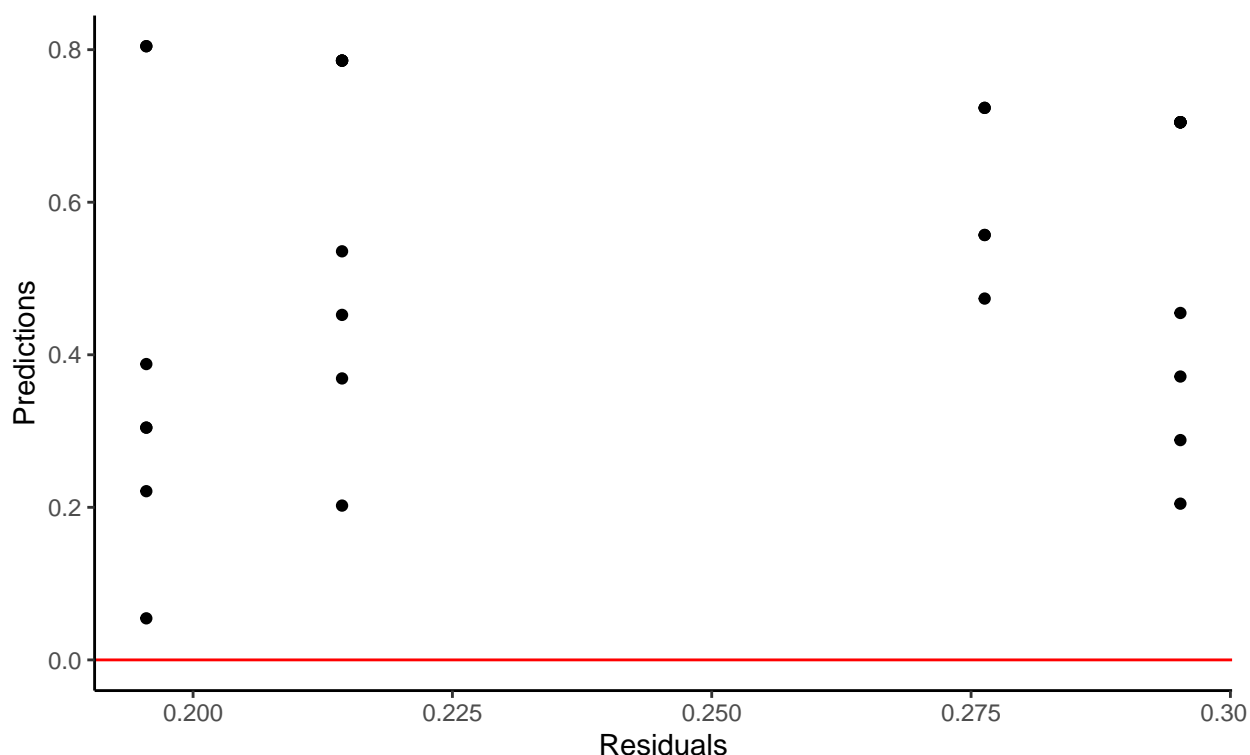
Figure 2
Residual Plot


```
## 
## Call:
## lm(formula = share_questions_responded ~ Incentive_Structure +
##     accuracy_rate + English_Native + International + Workload,
##     data = data_final)
## 
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.22544 -0.12673  0.00561  0.09507  0.31845
## 
## Coefficients:
##                             Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  0.53921    0.13428   4.016 0.000507 ***
## Incentive_StructurePositive -0.12488    0.06449  -1.936 0.064674 .
## accuracy_rate                0.66465    0.31681   2.098 0.046618 *
## English_NativeYes            0.07545    0.08200   0.920 0.366652
## InternationalYes            -0.02382    0.08476  -0.281 0.781053
## WorkloadSmall                0.29052    0.06841   4.247 0.000282 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 0.1552 on 24 degrees of freedom
## Multiple R-squared:  0.6404, Adjusted R-squared:  0.5655
## F-statistic: 8.547 on 5 and 24 DF,  p-value: 9.271e-05
```

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Fri, Apr 29, 2022 - 17:08:36

Table 2: Share of answers responded and Controls

	(1)	(2)	(3)	(4)	(5)
	Dependent variable:				
	Share of answers responded				
Positive Incentive Structure	−0.125*	−0.100	−0.071	−0.087	−0.150*
	(0.064)	(0.083)	(0.083)	(0.088)	(0.083)
Share of correct questions	0.665**	0.594	0.653	0.759*	
	(0.317)	(0.410)	(0.419)	(0.441)	
Native English Speaker	0.075	0.083	0.182**		
	(0.082)	(0.106)	(0.087)		
International Student	−0.024	−0.157			
	(0.085)	(0.102)			
Small Workload	0.291***				
	(0.068)				
(Intercept)	0.539***	0.676***	0.527***	0.642***	0.861***
	(0.134)	(0.169)	(0.142)	(0.140)	(0.059)
Observations	30	30	30	30	30
R^2	0.640	0.370	0.310	0.193	0.105
Adjusted R^2	0.565	0.269	0.231	0.134	0.073
Residual Std. Error	0.155 (df = 24)	0.201 (df = 25)	0.206 (df = 26)	0.219 (df = 27)	0.227 (df = 28)
F Statistic	8.547*** (df = 5; 24)	3.673** (df = 4; 25)	3.896** (df = 3; 26)	3.238* (df = 2; 27)	3.286* (df = 1; 28)

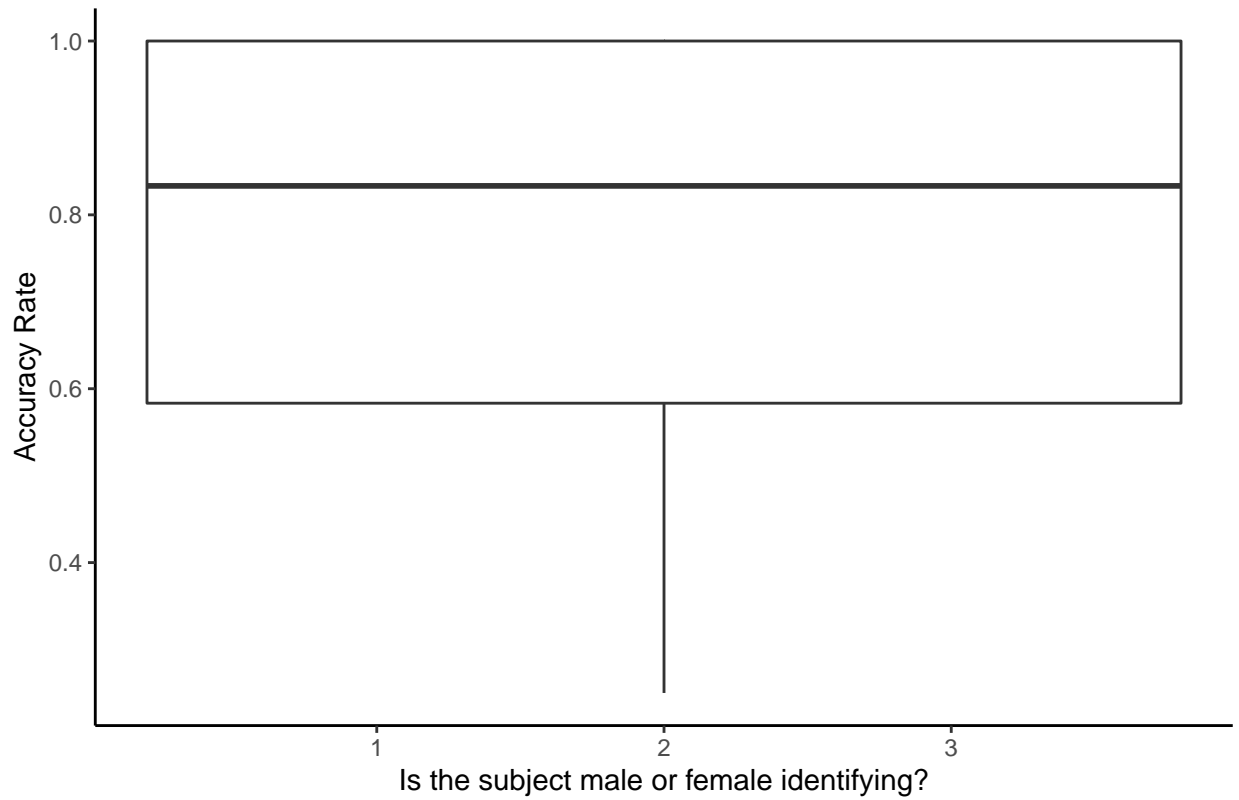*Note:* *p<0.1; **p<0.05; ***p<0.01

Figure 2: Share of Questions Responded vs. Incentive Structure

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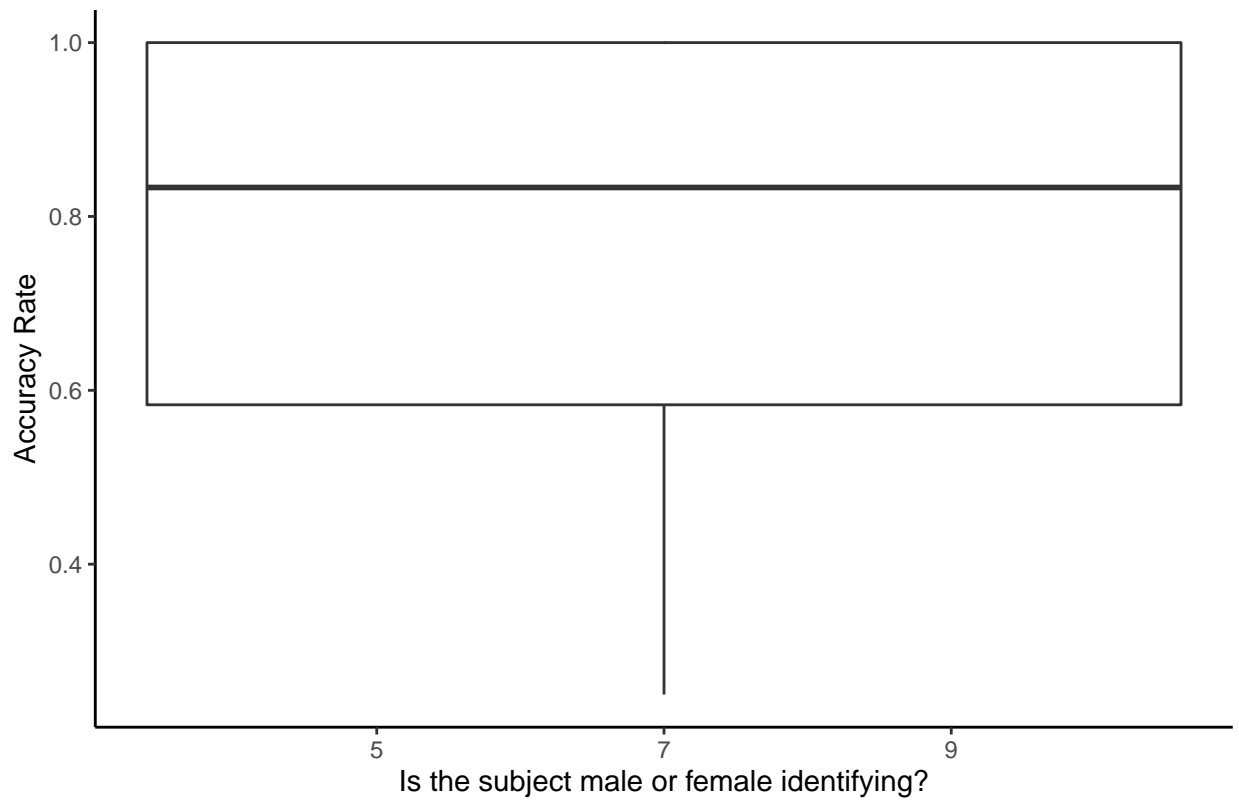Figure 2: Share of Questions Responded vs. Incentive Structure

Figure 2: Share of Questions Responded vs. Incentive Structure

Is the subject male or female identifying?