

Data Analysis System Develop for physicians completing PANSS testing and the effect language has on the score

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Summary

The intent of this report was to develop a data entry and analysis system for the PANSS instrument where results could be calculated in less than a half hour. The data entry system was designed to give each physician a unique ID, a language selection, a scale to input the severity of each symptom and save all entries into a file. The data analysis system was designed to retrieve the saved file and allow physicians to enter their unique ID. The data analysis system determined whether the physician received a passing score for each PANSS system and displayed the overall results for physicians receiving passing scores based on their language. From this analysis it was determined that language does influence the passing score of the physician.

Introduction

The Positive and Negative Syndrome Scale (PANSS) Instrument is a test used for accurately assessing the status of a patient's psychosis. The PANSS assessment involves physicians ranking a patient's psychological symptoms on a scale from 1 to 7, low to high respectively.

There are thirty different psychological symptoms that the physicians will rank. The first seven scaled symptoms are the positive symptoms, delusions, conceptual disorganization, hallucinatory behavior, excitement, grandiosity and suspiciousness/persecution and hostility. The next seven scaled symptoms are the negative symptoms, blunted affect, emotional withdrawal, poor rapport, passive/apathetic social withdrawal, difficulty in abstract thinking, lack of spontaneity and stereotyped thinking. The final symptoms scaled are the generic symptoms, somatic concern, anxiety, guilt feeling, tension, mannerisms and posturing, depression, motor retardation, uncooperativeness, unusual thought content, disorientation, poor attention, lack of judgement and insight, disturbance of volition, poor impulse control, preoccupation and active social avoidance.

This report is studying the affects of the PANSS instrument being used in different languages and the affects that language has on a physician receiving a passing score. This report explains the development of the Apps for a PANSS testing workshop for the data entry and the data analysis.

The data entry app was designed to be used during the PANSS testing and the data analysis app was designed to be used after all physicians in the workshop had entered their data.

Data Collection Protocol

In order to collect the data, an application was developed using the Shiny Package in R. To use this application each physician must have access to a computer and the internet during the assessment.

The app is accessible through a webpage that is published by the Statistical Consulting Services from the Department of Mathematical Statistics at the University of Calgary.

This application gives each physician a unique Rater ID, and each physician would be able to select their choice of language to complete the ratings of the patients symptoms.

Image of the Language input

The application displays the three symptom sections, positive, negative and generic, in individual columns. The first column displays the seven positive symptoms, the second column displays the seven negative symptoms and the last column displays the 16 generic symptoms. Each physician can rate the symptom on a slider-scale between 1 (low) and 7 (high). Once the physician is satisfied with all of their responses, they can submit their responses. All of the submitted responses are collected in a comma-separated values (csv) document.

Image of the Slider-Scale

Data Analysis System

To create a quick and effective data analysis system an application was developed using the Shiny package in R. To view the results from the data analysis an individual physician would need access to a computer and the internet or the overall results could be shown to all physicians on an overhead screen.

The application is also accessible through a webpage that is published by the Statistical Consulting Services from the Department of Mathematical Statistics at the University of Calgary.

The application has a dropdown menu where the physician can choose to display their results, a check box set the results by language and a dropdown menu where each individual physician can enter their Rater Id and the results of the workshop will be displayed.

The data analysis application gathers the data from the csv file that was created in the input application. The data then runs through a data cleaner which checks that there are no responses outside of the scaled data, and there are no responses in letters or symbols.

Data Analysis

Physician's Passing Score

To determine if a physician passed or failed the training they must meet certain criteria. The first criteria check was comparing each physician's symptom rating to an expert's symptom rating, if the physician's rating was within 1 of the expert's rating they received a pass on that symptom.

The second criteria check was the total number of "pass" questions in the positive, negative and generic symptoms sections. To receive a "pass" in the positive and negative symptoms sections at least 5 out of the 7 symptoms must be a "pass". To receive a "pass" in the generic symptoms section at least 10 out of the 16 must be a "pass".

The third criteria checked was if the physician "passed" all three sections. If the physician "passed" all three sections, then they received a "pass" for the PANSS training.

The following table shows the results of the physicians.

RATER	LANG	Passes
1	English	TRUE
2	French	TRUE
3	English	FALSE
4	English	FALSE
5	English	TRUE
6	English	TRUE
7	English	FALSE
8	English	TRUE
9	English	TRUE

RATER	LANG	Passes
10	English	FALSE
11	English	TRUE
12	Italian	TRUE
13	English	TRUE
14	English	FALSE
15	English	TRUE
16	French	TRUE
17	French	TRUE
18	English	FALSE
19	English	TRUE
20	English	TRUE
21	English	FALSE
22	English	TRUE
23	English	TRUE
24	English	TRUE
25	English	TRUE
26	English	TRUE
27	Italian	FALSE
28	English	FALSE
29	English	TRUE
30	French	TRUE
31	Italian	FALSE
33	English	TRUE
34	French	TRUE
35	French	TRUE
36	English	TRUE
37	English	TRUE
38	Italian	TRUE
39	English	TRUE
40	Italian	FALSE
41	English	TRUE
42	French	FALSE
43	Italian	TRUE
44	French	FALSE
45	French	TRUE
46	French	TRUE
47	English	TRUE
48	English	FALSE
49	English	TRUE
50	English	TRUE
51	French	TRUE
52	English	TRUE
53	English	TRUE
54	English	TRUE
55	Italian	FALSE
56	English	TRUE
57	Italian	FALSE
58	English	FALSE
59	English	TRUE
60	French	FALSE
61	Italian	FALSE
62	Italian	FALSE

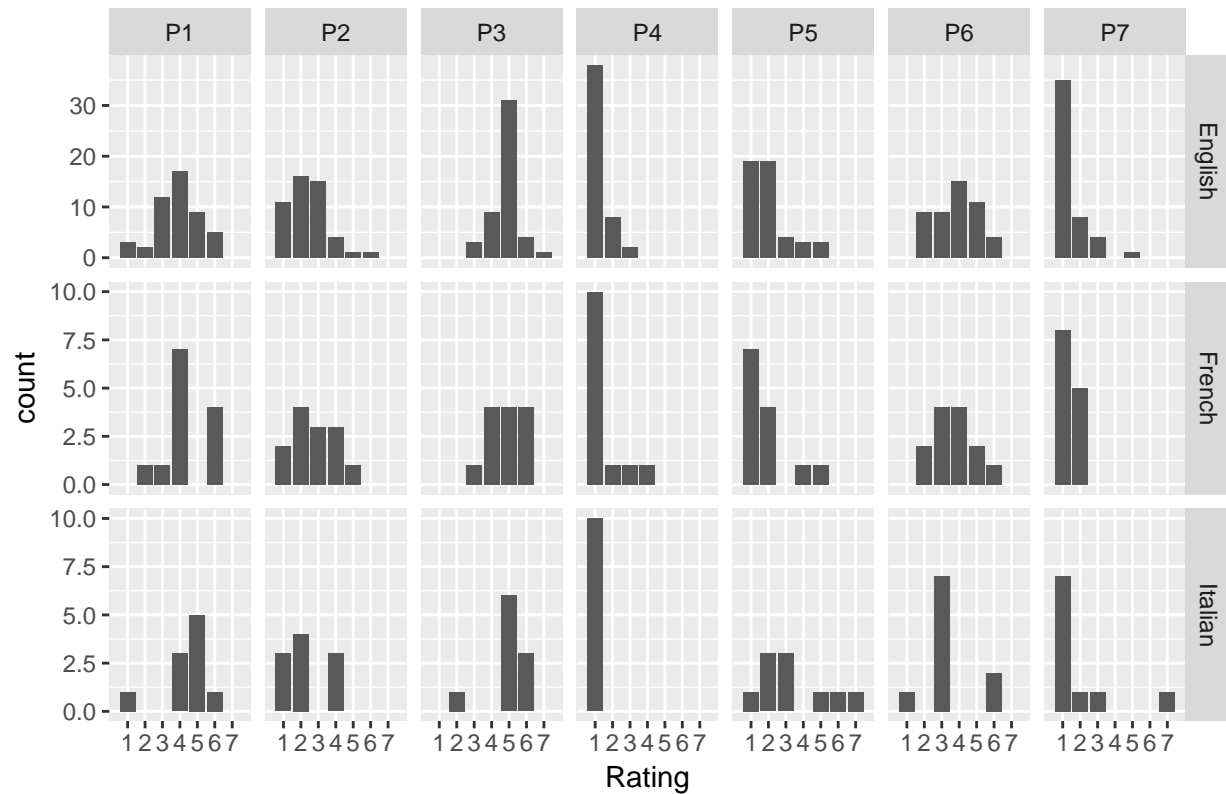
RATER	LANG	Passes
63	English	FALSE
64	English	TRUE
65	English	TRUE
66	English	TRUE
67	English	FALSE
68	French	TRUE
69	English	FALSE
70	English	FALSE
71	English	TRUE
72	English	TRUE

Affect of Language on Passing Score

To visualize the data histograms of the section and symptoms were stratified by language.

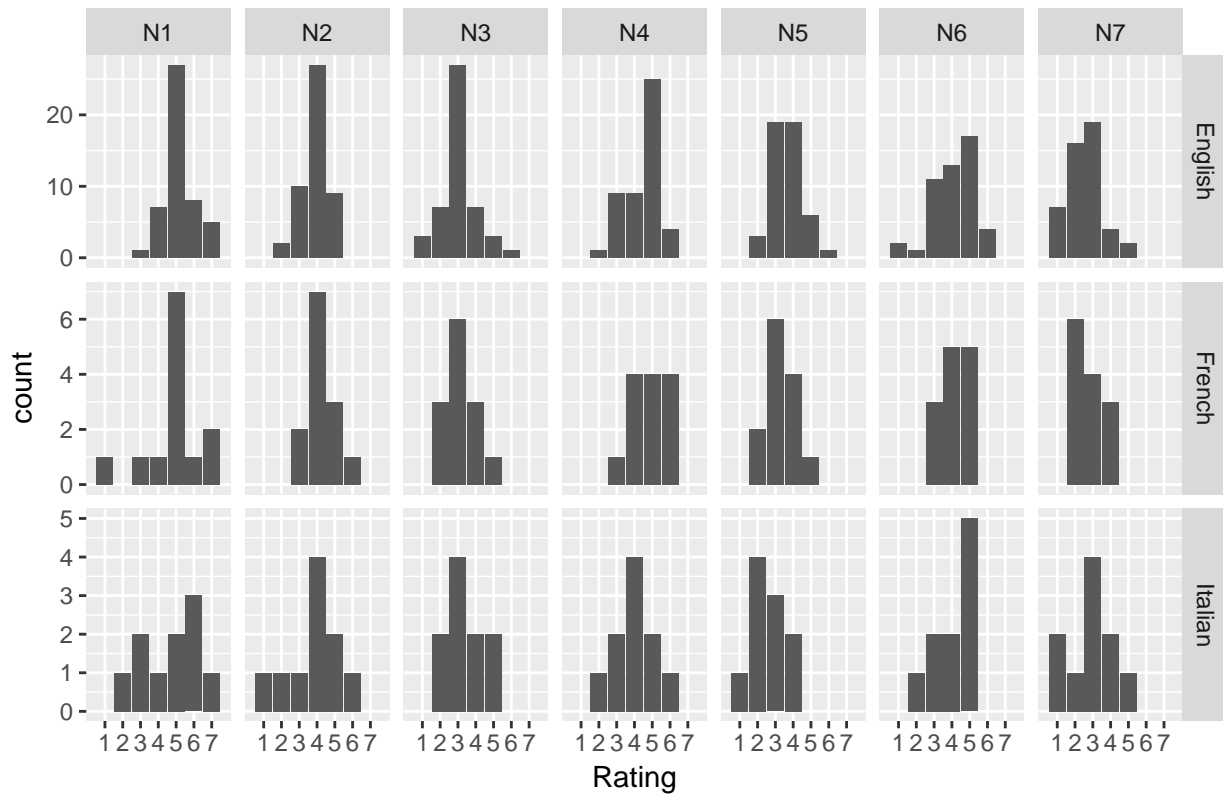
```
panss_tests %>%
  select(
    RATER
    ,LANG
    ,starts_with("P")
  ) %>%
  gather(
    key = "Question"
    ,value = "Rating"
    ,-RATER
    ,-LANG
  ) %>%
  ggplot(aes(x = Rating)) +
  geom_bar() +
  facet_grid(
    LANG ~ Question
    ,scales = "free_y"
  ) +
  scale_x_discrete(limit = 1:7) +
  labs(title = "Histogram of Positive Ratings by Language")
```

Histogram of Positive Ratings by Language



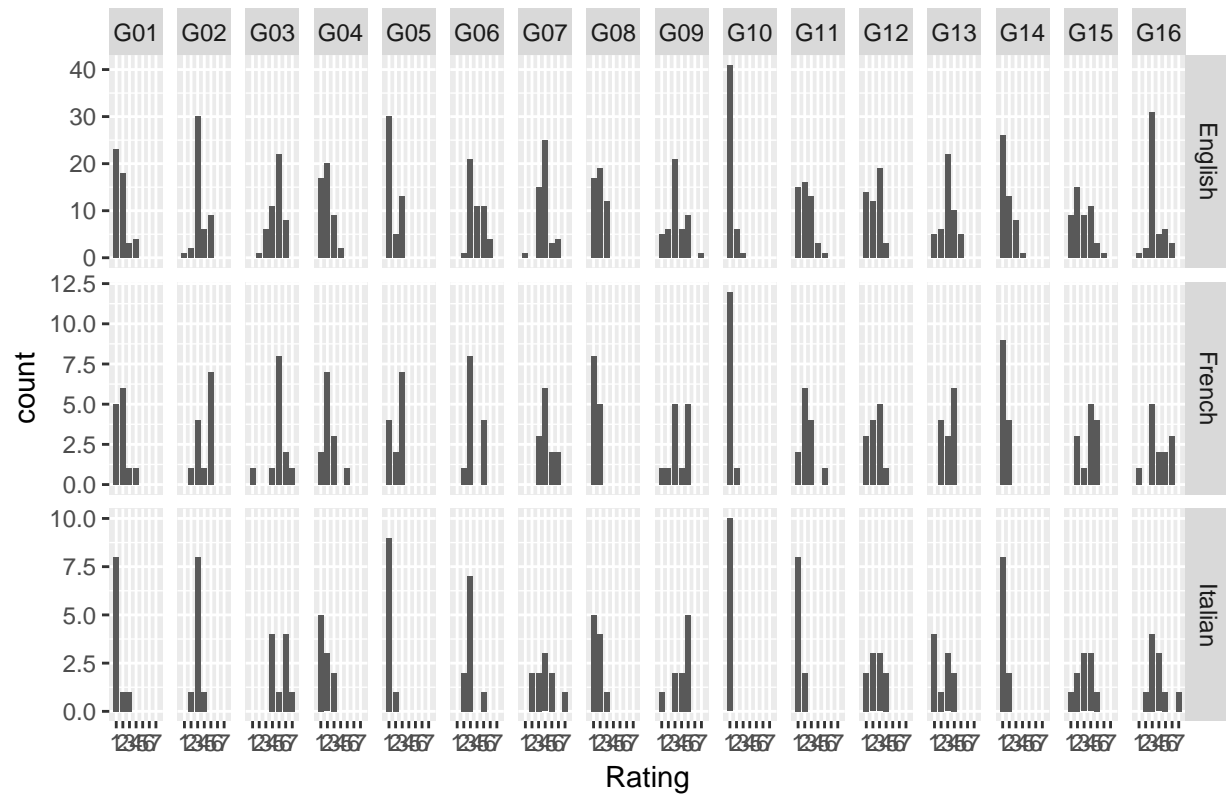
```
panss_tests %>%
  select(
    RATER
    ,LANG
    ,starts_with("N")
  ) %>%
  gather(
    key = "Question"
    ,value = "Rating"
    ,-RATER
    ,-LANG
  ) %>%
  ggplot(aes(x = Rating)) +
  geom_bar() +
  facet_grid(
    LANG ~ Question
    ,scales = "free_y"
  ) +
  scale_x_discrete(limit = 1:7) +
  labs(title = "Histogram of Negative Ratings by Language")
```

Histogram of Negative Ratings by Language



```
panss_tests %>%
  select(
    RATER
    ,LANG
    ,starts_with("G")
  ) %>%
  gather(
    key = "Question"
    ,value = "Rating"
    ,-RATER
    ,-LANG
  ) %>%
  ggplot(aes(x = Rating)) +
  geom_bar() +
  facet_grid(
    LANG ~ Question
    ,scales = "free_y"
  ) +
  scale_x_discrete(limit = 1:7) +
  labs(title = "Histogram of Generic Ratings by Language")
```

Histogram of Generic Ratings by Language



Conclusions

Recommendations