CS9.421 Behavioral Research & Experiment Design

Assignment 1

Aaryan Sharma
2020115008

Q1:

Part A:

i. Null Hypothesis: There is no qualitative difference between the way nationalistic rhetoric is used in conservative politics as opposed to liberalist politics.

ii. Extraneous variables:

a. The experimenters did not consider the context of the quotes and speakers, as a quote handpicked from the whole speech may not represent the politician's inclination towards any ideology.

b. The experimenters' political biases could've affected the results as they manually filtered the politician's quotes into liberals and conservatives. And there was no method to cross-check whether the manual annotation was correct.

Part B:

i. Null Hypothesis: Music has no impact on human creativity.

ii. Extraneous variables:

a. Mood and emotional state of the participants before they participated in the study.

b. Participant's music preferences: In the given study, participants' music preferences were not considered, and different genre, tempo, rhythm and familiarity could affect their moods differently.

c. The experimenters do not consider factors like background noise level and environmental distractions.

Q2:

Suppose we conduct an experiment to study the effects of nature exposure on mood enhancement in engineering students. The research question for the same would be:

Does spending time in a natural environment (quantitative element) improve the mood (qualitative element) of engineering students?

The advantages of using a mixed-method approach are primarily to mitigate the weaknesses of using a single method for a particular experiment. For example, qualitative analysis often lacks external validity because of a small sample size, which can be achieved using quantitative analysis.

i. Qualitative research usually has a minimal sample size, which limits the generalizability of the research. With a mixed methods approach, this particular weakness can be mitigated by externally valid quantitative research, which increases the generalizability of the research.

ii. Mixed Methods research can not be limited to established research paradigms, allowing the researcher to be more flexible in research design.

iii. Using the mixed methods approach for data collection also increases the credibility of the results. If the qualitative data converge with the quantitative data, then the validity of the conclusion strengthens, also known as triangulation.

Q3:

Part 1:

a. Independent Variables and Dependent Variables:

   i. Independent Variables: Dora's interaction with tribe members
   ii. Dependent Variables: The cultural practices and the socio-political dynamics of the remote indigenous tribe.

b. Extraneous Variables:

   i. Random Extraneous Variables: As Dora interacts with the tribe as an anthropologist, there shouldn't be any random extraneous variables in an observational study.
   ii. Constant Extraneous Variables: Physical environment of tribe's location, cultural differences, socio-economic conditions, language barriers.
   iii. Confounding Extraneous Variables: Dora's perspectives, her behaviour while interacting and participating in the activities

c. Type of Experiment:

   Since Dora interacts with and observes the tribe in their natural environment, this experiment is field research.

d. Conditions/Groups and Related/Unrelated Design:

   i. This study has **no specific groups** in the traditional experimental sense.
   ii. The study **does not explicitly follow related/unrelated experiment design**.

Part 2:

a. Independent Variables and Dependent Variables:

   i. Independent Variables: The type of drink any group is assigned, i.e. the all-new Sttinger or the original Sttinger (placebo).
   ii. Dependent Variables: The ability of students to complete the BRED assignment and the effect of the drink on sleepiness.

b. Extraneous Variables:

   i. Random Extraneous Variables: Individual metabolism, sleep patterns, age, gender
   ii. Constant Extraneous Variables: Assignment difficulty, time of the day when the assignment is done, and the environment in which participants complete the assignment.
   iii. Confounding Extraneous Variables: none

c. Type of Experiment:

   Since participants are randomly divided into two groups, i.e., the experiment group and the control group, this experiment is a **true experiment**.

d. Conditions/Groups and Related/Unrelated Design:

i. The experiment requires **two groups**: the experiment group receiving the all-new Sttinger and the control group receiving the placebo, the original Sttinger.
ii. The experiment design is **unrelated** since both groups are not related to each other before the experiment and are then randomly assigned from the same set of participants, and then both groups are treated independently.

Part 3:

a. Independent Variables and Dependent Variables:

i. Independent Variables: Number of hours of sleep per night
ii. Dependent Variables: Academic performance (**CGPA**)

b. Extraneous Variables:

i. Random Extraneous Variables: None
ii. Constant Extraneous Variables: academic environment, study habits, university policies and grading system, and lifestyle of students.
iii. Confounding Extraneous Variables: caffeine consumption of students, social life/ extra-curricular activities

c. Type of Experiment:

Since Dora is not manipulating any variables, she observes and collects data. Therefore, this experiment is **non-experiment**.

d. Conditions/Groups and Related/Unrelated Design:

i. In this non-experiment study, there are **no specific groups**.
ii. The given design is a **correlational study**.

Q4:

In the given paper, the authors (Piqueras-Fiszman and Spence) want to answer if the cup's colour influences the consumer's perception of a hot beverage.

a. The given experiment is an example of a **field experiment** where 57 volunteers took part in the study who were attending a day-long sensory event, and the given tasting activity was also included in the day's activities.
b. The given study is a field experiment based on convenience sampling. However, the participants were not in their natural environment, but they volunteered to be monitored for the whole day in various activities, which could've affected their natural behaviour. Now, to take the given experiment from lab to land,
    i. Set the experiment in a more natural and real-world setting, such as a café, a coffee house, or a food festival. Instead of relying on a particular café, we can collect data from various cafes and coffee to make the research more generalizable.
    ii. Moreover, to record better responses, we can ask the customers to fill out a survey so that they act naturally without the knowledge of being monitored.

The pros and cons of taking this experiment from lab to land are:

PROS:

- Better sampling methods result in better representation of the population and more credible results.
- Conducting the research in a natural setting adds external validity to the results, making the research more generalizable.
- The participants will respond more naturally without bias when they don't know they are being monitored.

CONS:

- We have new potential confounding variables included in this situation, such as time of the day, café location, ambience and other items in the food menu.
- In a natural setting, we have lesser control of the environment, and we cannot control variables such as noise and the behaviour of other customers.
- Customer loyalty to a particular café may affect the result.
- Ensuring consistency in the environment of all locations is complex, and therefore, standardization becomes more challenging.