Homework 1

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Deviant aggressive behavior:

If Theory I were correct, people would perform deviant aggressive behavior because of several reasons. First, such actions were never punished. For example, a child may constantly use profanity because his or her parents never discipline this child for such behavior. Second, people may believe their deviant behavior would not be caught. For example, a person may commit vandalism because he or she believes that no cameras or people would see this behavior. Third, the reward of the behavior outweighs the punishment. For example, if a drug dealer earned one million dollars by selling crystal meth but was only charged a hundred fine, then he or she may continue this action until receiving a harsher punishment. Therefore, base on the Theory I, the appropriate social policies should either promote supervision on people's deviant behavior or increase the punishment. More specifically, the first strategy may suggest the city government to increase surveillance cameras in the city. The second strategy can be something like punishing criminals with longer sentences into jail or even the death penalty for those who commit severe deeds.

If Theory II were correct, there would be two necessary conditions for people to commit deviant aggressive behavior. First, there are presences of personal authority figures. Second, people are frustrated in their personal life. For example, a child may be rude to parents because he or she performed badly at school, and the parents impose too much control over this child. There are two appropriate strategies to reduce deviant aggressive behaviors. First, reducing people's frustrations with their lives. For example, the government can provide more free mental counseling activities for citizens or improve its social welfare services. Second, empowering

people to make decisions on their behalf and reducing the power of the authority figures. For example, it may appropriate to grant workers the right to establish a labor union to contain the power of bosses or to give citizens universal rights to vote against the public officials, with whom they were not satisfied.

If Theory III were correct, people would engage in deviant aggressive behavior because they perceive discriminations in the society. Therefore, one appropriate social policy to address this would be affirmative actions. For example, universities can grant more seats for students from groups known to have been discriminated against in history, and firms can give some extra credits for people who are previously underrepresented, such as female workers in tech-firms. While affirmative actions may promote equalities among various groups, it might introduce new discriminatory issues. So, social policies should also concern equity in society. More specifically, professors should not have differential standards to grade students from different groups, and bosses should only give a bonus to workers base on their performance.

If Theory IV were correct, individuals would choose to commit deviant aggressive behavior because they receive information from the deviant subculture. To reduce deviant aggressive behavior, a policy-maker should focus on education. A school is an important institution for socialization. Therefore, to reduce the negative effect from a deviant subculture, social policies should promote universal basic education for children to be socialized into normal roles. Second, the government can prevent people from being socialized into a deviant role by censoring deviant subcultures.

Waiting until the last minute:

a:

The observation that people often do things at the last minute might be true because people may not be able to resist current tempting events, even for those who have relatively high self-control ability. More specifically, when people were presented with certain seductive activities, such as parties, video games, or TV shows, they could not help engaging in these incidents and fail to stick to their original schedules. Therefore, people would keep procrastinating until the deadline forces them to finish their works.

b:

Base on the previous answer, the explanatory model I would generalize, is that the possibility for an individual to procrastinate until the deadline is negatively associated with his or her ability for self-control and positively related to the presences of seductive incidences. In this model, the dependent variable is the possibility for a person to wait until the last minute, and the independent variables are a person's self-control ability and the presence of distracting events.

c:

The alternative model that also can lead to the observation of procrastination is based on another theory: if individuals were confident in finishing a task in a short time, they would wait until the last minute, no matter how difficult the job was. By contrast, a person would start his or her task right away if he or she was not confident in the task, no matter how easy it was. Therefore, in this alternative model, the possibility for a person to do things at the last minute depends on how confident this person to finish the task. In this model, the dependent variable is the possibility for a person to wait until the last minute, and the independent variable is the confidence in finishing the task.

d:

Based on the explanatory model, it could lead to two predictions. The first prediction is that for people who are capable of controlling themselves, a plethora of seductive events could lead them to procrastinate until the deadline. On the contrary, the second prediction is that for people who lack self-control, they might start their tasks right away if there is nothing interesting for them to do.

The alternative model would predict that for a person who is confident in finishing a task, he or she will wait until the last minute, even if the task could be difficult. Moreover, this model can also predict that for a person who lacks confidence, he or she would start doing works right away even if the task is easy.

Selecting and fitting a model:

1:

In general, compared with an inflexible model, a flexible model would be more advantageous in analyzing a large sample size. Moreover, a flexible model can find a non-linear effect. Nonetheless, such a model could introduce more noises when the variance of the error terms is high.

a. The sample size n is extremely large, and the number of predictors p is small.

Under this situation, a flexible model will outperform the inflexible one because the flexible model can take advantage of a large model to reduce the bias. More specifically, large sample size can be used to train the flexible model and will not cause the overfitting problem. By contrast, because the number of predictors is small, an inflexible model might

be too simple to capture the complexity of a real-life problem and, therefore, lead to a large biased result.

b. The number of predictors p is extremely large, and the number of observations n is small.

Under this condition, an inflexible model would be better. Because the number of observations is small, using a flexible model can cause overfitting. As a result, a flexible will only lead to a minor reduction in bias but introduce more variances.

c. The relationship between the predictors and response is highly non-linear.

The flexible model is better in capturing the non-linear relation, using the flexible model will be better under this condition.

d. The variance of the error terms $\sigma 2 = Var(e)$ is extremely high.

Because the flexible model will introduce too much noise when the error terms are high, using an inflexible model would be better.

2:

The irreducible error arises from the fact that the predictors do not completely explain the outcome. In other words, there are variables outside the predictors that still can affect the outcome. Therefore, no matter how flexible the model is, the irreducible error curve is a horizontal line.

As flexibility increases, the model fits the training data more closely. Therefore, the curve of the training error is monotonically decreasing.

The testing error curve has a “u” shape because as the flexibility increase, the model can be overfitting and can only explain the effect in the training data set but cannot be generalized into other test sets.

The squared bias curve is also monotonical downward sloping. As the model becomes more flexible, it will approximate the real-life problem better than the inflexible ones. Therefore, the squared bias will monotonically decrease as the model get more flexible.

Variance refers to the amount by which the estimations would have changed using different training data sets. If the model fits the observations very closely, changing any observation will cause the estimation to change in a significant way. As the flexibility increase, a model will fit more closely with a specific training data set. Therefore, using different training sets will result in a very different estimation. Therefore, the variance will monotonically increase as the learning method becomes more flexible.