Homework 1

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a. Deviant aggressive behavior

All four theories provide a unique explanation of deviant aggressive behavior, hence leading to four different social policies to reduce the behavior as followed.

Theory I: If deviant behavior is only based on the reward or punishment, then there are mainly two approaches to restrain it. First, enhance the punishment they received. For example, if death penalty may be applied for the felony (i.e. murder), then it would be a huge deterrence towards the potential criminals, who would think twice before conducting the deviant behaviors. Second, increase the awards they received for not conducting the deviant aggressive behavior. In terms of revolution, there is an old saying that poor people in the mountains are more likely to rebel. If they are becoming more and more economic well-being and enjoy the social stability, who would go for those deviant aggressive behaviors (like criminals, rebellions and revolutionary actions)? So in this case, the social policy that awards the citizens is to maintain their economic well-being and social stability as much as possible. As a rational people, under these two approaches, it is very unlikely to happen deviant aggressive behaviors.

Theory II: This approach attributes the cause to the individual level. In this theory, individual feels hostile and expresses the anger to the environment surrounded. In this case, there are also two approaches to make it under control. First, detect and minimize the personal hostility as much as possible. In this case, mental health needs to be highlighted. Paying more importance on citizens' mental health as well as establishing an early warning system to intervene those citizens who have mental health problems are crucial social policies to solve the aggressive behavior. Secondly, when some people have already expressed hostility to the society, making it under control is the second step. More frequent mental intervention, even mental monitoring would be a good option to do so. Also, restraining its potential danger outreach would be another significant approach. For example, although second amendment to US constitution guarantees citizens' right to possess weapon, however, the social policies like clean sheet check and other gun control activities are an excellent example to minimize the potential threat caused by the personal hostility.

Theory III: This approach sets the perquisite that social rules may discriminate among

people and oppress individuals, which is like the exploitation theory in the Marxism. Under this setting, the first approach to minimize the behavior is to guarantee the social equality as much as possible. This can be achieved by bridging the gap between the poor and rich economically and socially. For example, imposing more taxes on the rich and reducing taxation for the poor is one key policy to bridge the gap. Apart from economic perspective, providing opportunity for the poor to achieve the leap in social class is another important policy. For example, subsidizing more first generation students to the college and giving more reeducation opportunity for those less-educated citizens are excellent social policies to achieve this. By applying these approaches, citizens are less likely to regard themselves as being opposed, instead, they are more likely to believe that the leap in social and economic class can be achieved by their own effort, hence dramatically reducing the deviant aggressive behavior.

Theory IV: This theory pays more focus on the subculture, highlighting the influence of deviant subculture. To avoid deviant aggressive behavior, the first approach is to discourage these subcultures and limit the citizens access to those subcultures. For example, some citizens would believe they are destined as a gangster, which is their inborn social role since their all family members are gangsters. To solve this issue, fighting against those subcultures and limiting their exposure to gangsters by laws and regulations are important to prevent the deviant aggressive behavior. Also, some other soft policy might also be applied, including providing them the access to education, mental health intervention, exposure to other healthy subculture, which are vital in eliminating the deviant aggressive behavior.

b. Waiting until the last minute

    a. Procrastination has existed almost everywhere, from professors to students. It might have several explanations as followed.

    - Time management: Time management problem might be the most apparent explanation for procrastination. People don't make the plan at first, and they always handle something which seems the most urgent. Then they would find out those which seem not so urgent become urgent, so people are stuck in this procrastination circle, mainly attributed to not making the time management beforehand.

    - Efficiency: Efficiency might be the second explanation for procrastination. There is an

old saying that deadline is the first productivity. It is the deadline that pushes people forward and make people work more efficiently. For fear of the threat of passing the deadline, people would become more efficient and creative in such a short period of time, and always their mind run more smoothly during this period.

- Instant Pleasure: An interesting explanation for procrastination is that people are more likely to do things which they can get instant pleasure from. By just handing in the homework before the final deadline, people would have immediate pleasure for doing so while making it several days beforehand would make people not feel so much pleasure. So, under this explanation, people are more likely to choose to procrastinate since finishing the deadline at the last minute would give them the instant pleasure, making them feel much happier and more excited about it.

b. Model I is derived from the instant pleasure theory that people are more likely to procrastinate just because they want to feel this kind of immediate pleasure and excitement which just works before the deadline. So, model I is as followed.

Model I: People are more likely to take the action that can generate immediate pleasure.

c. Model II is derived from the efficiency theory: The more it is closed to the deadline, the more efficient people are. Following this theory, people adopt to become more efficient, thus choose to procrastinate. Model II is as followed.

Model II: People are more efficient when they are closed to the deadline.

d. For Model I, there might be two interesting predictions:

- **Prediction 1:** People are more likely to spend money (carpe diem) instead of making a saving for the long-term pleasure. Since spending money immediately can generate immediate pleasure as the excitement that people hand in the homework at the last minute, hence, people would prefer to spend money immediately (carpe diem) instead of giving long-term thought to the future (i.e. making a saving).

- **Prediction 2:** People would be less likely to have a long-term vision in this scenario. Since people highlight the immediate pleasure, then more long-term benefits would be

ignored, including health-care, pension etc. People would always look at the immediate effects or financial benefits that it may bring out instead of any long-term excitement (having healthcare or being enrolled for pension).

For Model II, there might be another two interesting predictions:

- **Prediction 3:** If efficiency is the only thing to be considered, then people are more likely to make everything done just before the deadline since this is the time when they have the highest efficiency. Even though people may have time far before the deadline, they would still choose to do it just before the deadline in terms of efficiency.

- **Prediction 4:** Whether deadline has move forward or postponed, people would still do the things just before the new deadline as deadline makes them more efficient.

c. Selecting and Fitting a model

1.

a. Flexible learning method would perform better because sample size is so large that overfit is unlikely to happen. Also, since the number of predictors p is small, it would not create a large model variance.

b. Flexible learning method would perform worse because similarly, since p is so large that it would be very likely to overfit. Also, the flexible learning method would lead to a huge increase in variance and only a small portion deduction in bias.

c. Flexible learning method would perform better because a flexible model would help us to find the non-linear effect and it is not so restrictive on fitting the model.

d. Flexible learning method would perform worse because since the variance is extremely high, it would be very likely to overfit.
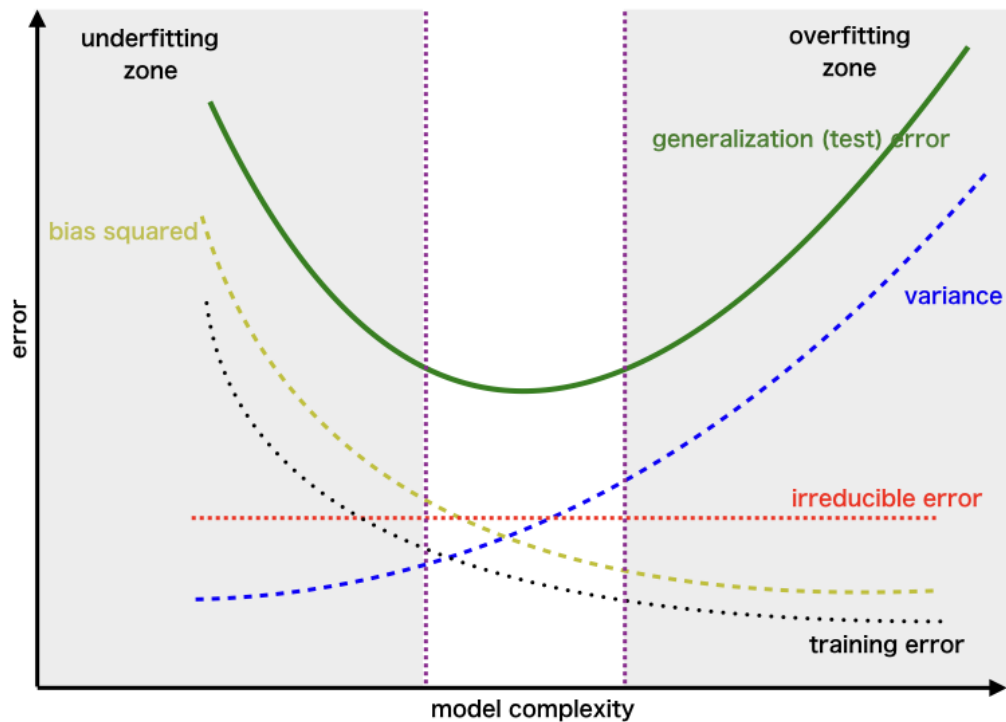
Figure 1 Graph about bias-variance tradeoff (Courtesy of Li Liu)[1]

2.

Bias: Apparently, the bias will decrease with higher flexibility. Because when it has more flexibility, the bias reduces, and the variance increases. Bias is the difference between our model and the real data. Increasing the complexity would reduce the difference among the model and the real data apparently, however, we would see that as flexibility increases further, there is a less deduction of bias.

Variance: Similarly, the variance will increase with higher flexibility. As complexity grows, it would represent a large noise component, making their predictions less accurate and having more effect on parameter estimates, which overfitting are likely to happen.

Training error: Training error would always decrease with more flexibility, since a model with higher flexibility would produce less error on the training data.

Test error: Test error would first decrease and then increase as complexity grows. Since when complexity is small, it is very likely to become underfit when model performs poorly on training data. However, when the complexity is too large, it would cause overfitting when the model performs good on training data but not good on overall prediction. Hence, this kind of

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[1] Retrieved from https://towardsdatascience.com/the-bias-variance-tradeoff-8818f41e39e9 on Jan. 19, 2020

bias-variance tradeoff leads to the first decrease then increase relationship of the test error.

Irreducible error curves: As it is named, irreducible error is always the same regardless of which model it might take. It is a measure of the noise in our data. No matter how good our data is, there will be certain amount of irreducible errors that cannot be removed.