

Homework 1: Model Building and Model Selection/Fitting

Building models

Deviant aggressive behavior

1. What social policy might be appropriate to reduce deviant aggressive behavior if Theory I were correct? Theory II? Theory III? Theory IV?

Socially deviant aggressive behavior is defined as behaviors that violate social norms, such as committing a crime. In the following analysis of deviant aggressive behavior theories, we will propose an appropriate social policy for each and attempt to apply the policy to the example of mass shootings. With the prevalence of mass shootings, the debate over gun control has often fallen into the four ideological paradigms of the given theories. The question for policymakers and constituents is where does deviant aggressive behavior stem from and how is it acquired?

According to Theory I, deviant aggressive behavior is acquired through the experience of either positive or negative reinforcement. The causal dynamic is of learned behavior, wherein the aggressor will continue to act within the dualities of reward or punishment. At some point, according to the theory, the actor was rewarded for their deviant aggression and learned to repeat that action. Therefore an appropriate social policy would be to identify the source of the reward and to then either deny that reward or switch the signal to punishment. In the case of school shootings, it was once believed that violent video games where the player might be rewarded for their kills, was linked to the rise in aggression (Uhlman and Swanson, 2004). Others believed that it was "copy cat" syndrome that caused disenfranchised youth to look up mass shooters like those who perpetrated Columbine. Copycats would believe that the media attention given to shooters is a reward (Towers et al, 2015). To curb the behavior, policymakers could respond to shootings with a ban on first-person shooter games or request that media stations not to cover the shooter in their reporting, but rather focus on the victims instead.

Theory II offers an alternative framing. According to Theory II, "Deviant aggressive behavior is a symbolic expression of hostility toward personal authority figures." Implicit in Theory II is an understanding of social power structures wherein those that represent the hierarchy are resented. The theory, therefore, deals in symbolism: symbols of authority and symbols of defiance, wherein the deviant aggressive behavior is meaningful to the individual. In comparison to Theory I, Theory II implies the aggressor has higher levels of self-agency. The aggressor understands where they fall in the social hierarchy and, as opposed to simply responding to external stimuli (reward or punishment), the aggressor has internalized that structure and formed feelings that inform their action. The appropriate social policy would address these feelings and subvert resentment towards authority to more positive associations. Worth noting, the aggressive behavior is localized to direct figures like a parent or boss, or even public officials. Perhaps if a social policy were able to detangle the authority figure from authority and humanize these individuals, then instead of shifting the whole view of the system, the policy could focus on shifting the aggressor's view of the power-holding individual. For potential-shooters, the social policy may dictate intervention at the first sign of violent behavior and may mandate family counseling where hierarchy is taken away and all members are on equal footing.

Similar in some regards to Theory II, Theory III also takes a power structure approach in its explanation of deviant aggressive behavior. The theory states that such behavior is, "the rational action of

oppressed individuals". In a social system that does not benefit all its people equally, the theory expresses the belief that those that do not benefit, will be less likely to conform. It is a cost-benefit analysis of deviant behavior, where all players, including the aggressors, are rational actors. Therefore, the appropriate policy would be that takes away the market incentive for non-conforming behavior. One way to implement this policy would be to create a "bigger tent", one where the system is able to actually benefit all people, equally. Let us take the example of school shooters once more. With Theory III's framing, shooters are rational people that have been disenfranchised by society. If we give shooters what they want, perhaps more direct attention or acknowledgment of their issues, then they would be more likely to conform to norms.

Theory IV states that deviant behavior is learned and socialized through contact with a deviant subculture. It is not clear from the theory if the behavior is innate and lies dormant until contact with the subculture or if the genesis of the behavior begins and ends with initial contact. A social policy that may temper or subvert the socialization of deviant behavior would be through the banning of subculture platforms. In the case of radicalized shooters, this may mean the banning of extremist websites that glorify mass shootings. It may be difficult, however, to define what is deviance and what is a legitimate subculture. Perhaps the definition in social policy will fall to Justice Stewart's famous delineation of pornography, "I know it when I see it" (Lattman, 2007).

Waiting until the last minute

People often do things at the last minute (students turning in papers, professors grading exams, and so on).

a. Ask yourself **why** the observation might be true and write down your explanations.

Response: I have often wondered why procrastination appears to be the norm for some and not for others. I tend to fall on the extremes-- either I do the work very early or up until the deadline. If I am procrastinating there are a couple of explanations: 1) I have built expectations around the amount of work and displeasure the task will involve 2) I know I will not do the task perfectly and would, therefore, prefer not to do it 3) I do not have sufficient information and do not know how to proceed but instead of asking for clarification, the slipping time causes paralysis 4) I am overwhelmed by the number of tasks that need to be accomplished and do not know where to start

b. Generalize the explanatory model – that is, induce the most general, abstract model you can produce that still has the original observation as a consequence.

Explanatory model: Procrastination is caused by discomfort associated with the task. The level of stress associated with a task eclipses the need to finish the task in a timely manner.

c. Induce an alternative model that also has the original observation as a consequence.

Alternative model: If a task is considered low-lift and enjoyable, then I am more likely to get it in a timely manner.

d. For each of the two general models produced in (b) and (c), derive two interesting predictions (four predictions in total). Be sure the logical connection between your model and your predictions is explicitly stated and that any assumed facts concerning the world are made explicit.

1. Explanatory model predictions:
 - a. **If I like a class but then can not do an assignment perfectly, then I am likely to procrastinate.** The model assumes that my likelihood to do a task in a timely manner is predicated on my feelings towards the subject. It does specify if I find the subject challenging or easy. These factors are not associated with the model, rather perfectionism is the cause of discomfort and informs the stress that induces procrastination.
 - b. **If I dislike a class and then I will experience displeasure by working on an assignment for it, then I will procrastinate.** In this prediction, I assume that a dislike of a subject will extend to tasks associated with the subject. The displeasure is transferrable from class to extensions of that class, in this case, a homework assignment. This assumption is likely to hold true because class assignments tend to reflect subject matter in a class.
2. Alternative model predictions:
 - a. **If I enjoy conversing with a friend, then I am likely to text them back quickly.** The prediction follows the model specifications that there is associated pleasure from the task and that the text measures as low-lift, not requiring much work. The prediction assumes that I like my friend and that the expression of that enjoyment is to be prompt in reply.
 - b. **If I like working out and the gym is close, then I will go to the gym regularly.** The prediction here assumes that there are no other factors limiting my decision to go to the gym. Often we are faced with prioritizing needs, if I do not factor in other tasks in my analysis, then I will not fully be able to predict whether I will go to the gym. However, the prediction does follow the model in that pleasure and perceived low effort dictates prompt action.

Selecting and fitting a model

1. For each part, indicate whether we would generally expect the performance of a flexible statistical learning method to be better or worse than an inflexible method. Justify your answer.

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

I would expect the performance of a flexible statistical learning method to be better because the flexible model would leverage the large n .

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

If the number of predictors is large but the number of observations is small then the flexible model may be overfitted and would, therefore, be worse.

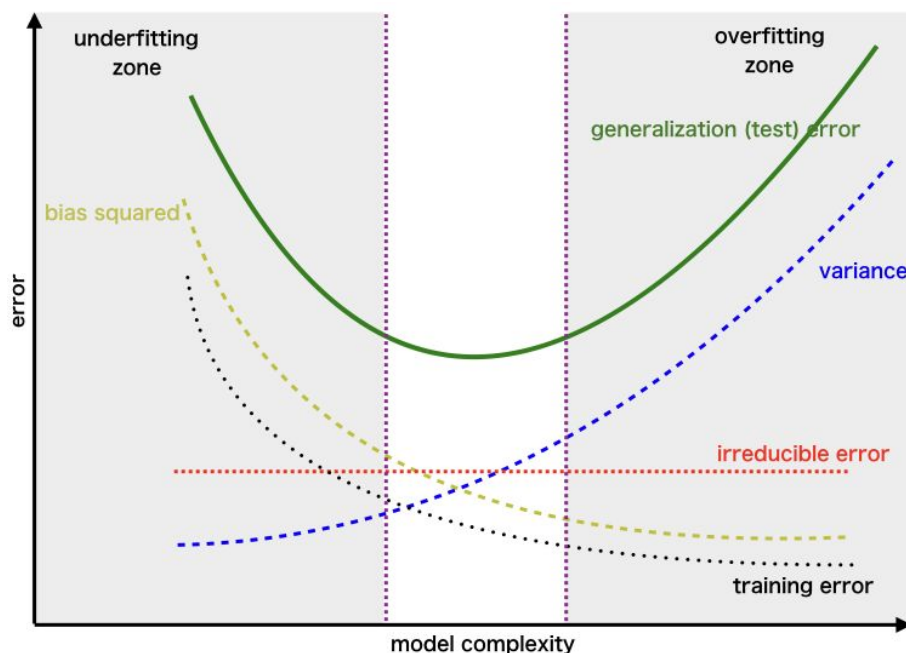
c. The relationship between the predictors and the response is highly non-linear.

The flexible learning method would perform better because an inflexible method like a linear regression would not account for the characteristics of the data.

d. The variance of the error terms $\sigma^2 = \text{Var}(\epsilon)$ is extremely high.

I would expect the performance of the flexible method to be worse because as the method adds more factors to describe the data, it will also model the high variance of error.

2. Bias-variance: Think about the graph including bias, variance, training error, test error, and irreducible error curves, moving from less flexible statistical learning methods towards more flexible approaches.



a. Explain why each of the five curves has the shape it has.

- **Bias curve** - Bias is the prediction accuracy. As the model grows more complex, it becomes more fitted to the data, the prediction accuracy decreases, and the bias therefore decreases
- **Variance curve** - Variance is how much a model would change if we used a different sample. So if the prediction model is close to the data, then increasing model complexity will also increase variance.
- **Training error curve** - The training error decreases because the model becomes more fitted to the training data
- **Test error curve** - The test error will decrease and then increase because at some point the model will become overfitted and the training data will diverge from the test data
- **Irreducible error curve** - there will always be some error that will be present, regardless of model adjustments

References:

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