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MACS 30100  
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Homework 1: Model Building and Model

## **Building models**

### **Deviant aggressive behavior**

Consider four well-known and widely believed theories of socially deviant aggressive behavior (e.g. criminal behavior, revolutionary behavior, rude behavior, etc.):

Answer the following question in 500-800 words:

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

The four given theories describe potential sources of socially deviant aggressive behavior, and each point would require separate but interrelated policy initiatives to address them.

The first of these theories, Theory I, states that deviant aggression is a learned behavior reinforced through operant conditioning. In other words, learned behavior is a result of incentivizing aggression through rewards for aggressive behavior, and the individual learns to pair aggression with impending benefits. If this theory were correct, disincentivizing aggressive behavior is key. If aggressive behavior is met with punishment instead, then (through the lens of this theory), the behavior would stop. However, the nature of the punishment used is crucial; research shows that reacting to aggressive behavior with aggression, as a punitive measure, actually exacerbates an individual's aggression and can lead to mental and behavioral dysfunction later in life (Miller-Perrin & Perrin, 2018). If Theory I correctly gauges the source of aggressive behavior, social policies that better subsidize mental health care would help families find therapists who can help them learn how to address aggression, particularly between ages 0-5 when children are the most developmentally malleable and receptive to psychosocial interventions (Miller-Perrin & Perrin, 2018). Policies that institute harsher legal penalties for deviant aggression in adulthood--coupled with rehabilitative measures--would also help break the association of aggression with reward.

The second theory, Theory II, posits that deviant aggressive behavior is the result of displacement: the transfer of feelings from somebody onto a more socially acceptable (or accessible) target. For instance, from the perspective of this theory, an individual who is angry at a government official might go home and yell at his wife instead. In other words, the individual feels angry but unable to communicate this to the person in question, and instead takes out his anger on someone else. If this theory is correct, it might be difficult to generate a social policy to counter it because it is difficult to predict who is vulnerable to becoming the target of an aggressor's displaced rage. Some of the policies from the previous paragraph, such as making mental healthcare more accessible, could help people understand the true source of their anger and how to more healthily manage it. Other policies might encourage better employer-employee relations through empathy trainings, to help foster better relationships in the workplace and therefore reduce the risk of anger towards an employer.

The third theory, Theory III, says that aggression is the natural, expected reaction of social inequity – individuals who have been historically marginalized or oppressed are far more likely to subvert social rules given that these rules cause them harm. The most obvious way to address this, assuming that Theory III is correct, is to encourage social policies that right social inequities. If social rules change such that they actually benefit oppressed people, then people will be incentivized to follow those rules. For example, black individuals are disproportionately affected by lead exposure in Chicago, pointing to the lingering effects of residential segregation (Muller & Winter, 2018), which could generate understandable anger (or, “deviant aggression”) from residents. However, rallying for policies that require more stringent lead checks could help mitigate this aggression. Alternatively (and controversially), some social policies might encourage creating programs to help oppressed individuals learn how to protest peacefully, without deviant aggressive behavior.

The fourth and final theory, Theory IV, states that aggressive behavior is the result of socialization, after

contact with a “deviant subculture”. The same social policies that were explicated above apply here as well-mandating social policies that generate accessible programs to help prevent this behavior from forming, or buffer the effects of socialized aggression. Additionally, moderation on some of these forums (e.g. 4chan and reddit) or minimum age requirements for joining might help, but this is unlikely given that it would be easy to circumvent these conditions. Some might argue that censoring these channels is counterproductive and even induces a backfire effect; others feel that censorship is the only way to deplatform deviantly aggressive individuals online.

### **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.**

Procrastination could stem from a range of issues: “internal” extenuating circumstances, including a lack of motivation, diagnosed or undiagnosed mental health problems, perfectionism, etc. It could also be a result of other “external” extenuating circumstances, such as physical illness, family obligations, or other logistical factors that take precedence over school. Or, it could be the individual’s choice, despite these factors.

#### **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.**

General model: our independent variable(s), extenuating circumstances (internal and/or external), lead to our dependent variable, procrastination.

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

Alternative model: Procrastination is *not* generated by extenuating circumstances. In this case, an individual has full control over whether or not they procrastinate, and they actively choose to, resulting in the original observation (procrastination).

#### **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.**

In order to derive predictions from these models, we need to operationalize and quantify our measures. For example, our dependent variable, procrastination, could be operationalized through a procrastination measure (e.g. The GPS measure, Sirois et al., 2019). Potential independent variables to measure causes of procrastination include course grades (could predict whether an individual procrastinates, or act as an outcome measure after procrastination occurs), self-regulation scores on some measure, and other specific mental health gauges (e.g. scores on depression or anxiety measures).

General model predictions:

1) *Chronic* procrastination (above a determined threshold on the procrastination measure) is correlated with having a mental health condition

2)

Alternative model predictions:

1)

2)

### **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.**

A flexible method would perform better. A large sample size helps prevent the over-fitting problem, which is (otherwise) the main drawback of using a flexible method.

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

An inflexible model would be better, to lower the risk of over-fitting the data (given the small amount of observations); it is less likely to pick up patterns that turn out to be noise.

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

A flexible model would be more adept at picking up on a non-linear relationship; inflexible models are better suited for linear relationships.

**d. The variance of the error terms is extremely high.**

High variance would mean a lot of noise, which a flexible method would be more likely to mistake for a meaningful pattern in the data; it would be better to use an inflexible method in this case.

**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.**

## References

- Miller-Perrin, C., & Perrin, R. (2018). Physical punishment of children by US parents: moving beyond debate to being. *Psicologia: Reflexão e Crítica*, 31(1), 16.
- Muller, C., Sampson, R. J., & Winter, A. S. (2018). Environmental inequality: The social causes and consequences. *Sociology*, 44, 263-282.
- Sirois, F. M., Yang, S., & van Eerde, W. (2019). Development and validation of the General Procrastination Scale (GPS-9): A short and reliable measure of trait procrastination. *Personality and Individual Differences*, 146, 26-33.