

Homework 1: Model Building and Model Selection/Fitting

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Deviant Aggressive Behavior

Theory I

If Theory I is correct, social policymakers should reward individuals for not behaving in socially deviant aggressive ways and punish individuals if they do behave as such. Firstly, policymakers should punish individuals who commit crimes with fines or imprisonment and reward criminals who reform their behavior with parole or reduced sentences. Secondly, policymakers can use military, police, or other security forces to crack down on revolutionary individuals and groups, while offering amnesty and protection to those who surrender willingly. Thirdly, policymakers can use public information campaigns to punish rude individuals (e.g. those who litter, make noise in the library, or cut lines) and reward polite individuals (e.g. those who give up their seats for the needy). Public information campaigns can create social norms where rude behaviors invite ostracism or censure and polite behaviors invite praise. Individuals experience and learn from the incentives and disincentives created by these policies.

Theory II

If Theory II is correct, social policymakers should reduce the hostility that individuals feel towards personal authority figures. One strategy would be for policymakers to reduce the likelihood that individuals develop feelings of animosity towards their parents, bosses, and public officials. Policymakers can encourage healthy relationships between parents and their children by educating parents about parenting techniques. Policymakers can also protect relationships between employers and employees by requiring rules and guidelines against workplace harassment. Similarly, policymakers can implement codes of conduct that govern how public servants interact with citizens. These measures may reduce abuses of authority that can contribute to personal frustrations and deviant aggressive behavior. Should these measures fail, the relevant authorities could consider strategies to ameliorate the hatred that individuals feel because of the abuses they may experience. The government could commit more resources to improving mental health and wellness. A well-funded public health system might increase access to counselling and therapy (pharmacotherapy, activity therapy, expressive therapy, and psychotherapy). With a higher level of psychological well-being, individuals might channel their feelings of hostility towards more constructive ends, instead of acting out in deviant and aggressive ways.

Theory III

If Theory III is correct, social policymakers should reform social rules to eliminate any systematic discrimination among people. Policymakers can pass legislation that forbids discrimination based on race, religion, gender, sexual orientation, or disability. Corrective measures such as affirmative action can complement such anti-discrimination laws. Also helpful is promoting public information campaigns, school programs, and diversity training on toleration, cultural pluralism, cultural assimilation, and multiculturalism. Where appropriate, policymakers can study why individuals who commit crimes, participate in revolutionary activities, or act in rude ways are dissatisfied with the legal system or social norms. To address these dissatisfactions, policymakers can reduce overly punitive punishments for breaking certain laws or discourage excessive social censure for violations of certain norms, customs, or traditions. In implementing such policies, policymakers

can reduce the number of individuals who feel that existing rules hurt them, or lessen the negative rules on marginalized or discriminated communities.

Theory IV

If Theory IV is correct, social policymakers should minimize the contact that individuals have with deviant subcultures. Different measures apply to dealing with criminal gangs, revolutionary organizations, and groups that tend to behave in rude ways. To minimize the exposure that vulnerable youths may have to gangs, policymakers can launch after-school programs, build recreation centers, and train adult mentors that attract these youths to healthier activities. At the same time, policymakers can tackle the problem of organized crime directly. Policymakers can increase the police presence in problematic neighborhoods, invest resources in studying and tracking criminal activities, and strengthen the ability of the judiciary to punish criminals. Similarly, policymakers can draw would-be revolutionaries away from extremist groups while reducing the presence of such groups. Policymakers can support grassroots, faith-based, and broad-based organizations that provide a sense of community and membership to their participants. The government can commit its military, police, and security agencies to identifying and breaking up extremist organizations. As for groups that may behave in rude ways, policymakers may have to think of creative ways to break up these groups or prevent out-group individuals from coming into contact with these groups. Consider groups of foreign tourists who behave, for reasons such as cultural unfamiliarity or difference, in ways perceived to be rude by locals. The authorities can provide educational materials to tour groups to encourage them to conform to local norms. If the offending groups of tourists do not comply, the authorities can minimize the contact that these tourists have with other tourists by barring non-compliant tourists from certain tourist attractions. This might minimize the likelihood that other tourists observe non-compliant tourists and mistakenly assume that the offending behavior is acceptable. Thus, using a combination of pull and push strategies, policymakers can reduce the influence that deviant aggressive groups have on individuals and prevent individuals from making contact with such groups.

Waiting Until the Last Minute

- a. The decision to leave things to the last minute may depend on an individual's perceptions on their own ability and willingness to do so. Over- or under-confidence in oneself may factor into the abilities explanation. Individuals may wait until the last minute because they think that they will be able to do so. Individuals who are accustomed to producing work under time and psychological pressures may feel that they can deliver upon the required work by the deadline. Alternatively, individuals may put off their work because they doubt their own abilities. Such individuals may procrastinate until they are forced by the deadline to begin their work and turn it in. As for the willingness explanation, individuals may simply choose to put things off. Some people might enjoy the adrenaline rush of completing their work successfully before an impending deadline. Others might unwittingly "opt" to procrastinate because they misperceive the amount of time they have, the number of commitments they have, or their own abilities to complete their work. A combination of these factors might contribute to the decision of any one individual to wait until the last minute.
- b. Summarizing the above explanations, one might generalize that individual perceptions of ability and willingness are the factors that drive the phenomenon of individuals waiting to the last minute. This ability-willingness model draws its inspiration from the field of economics.
- c. An alternative model might be that social institutions constrain the perceptions that individuals have about their ability and willingness to complete their work ahead of time. The institutional focus of this model is based on the structuralist school of thought.
- d. The ability-willingness model assumes that agency lies with individuals to make rational decisions that maximize their interests, based on the available information. If this model is correct, one might expect that individuals generally would not procrastinate if they comprehend that this is not in their interests. As discussed above, some individuals might misjudge their own willingness and ability to procrastinate. However, most individuals would procrastinate if it were in their interests (e.g. sense of accomplishment at completing work under pressure). They would also not procrastinate if it were not

in their interests (e.g. excessive stress or failure to complete a task). A more specific prediction is that if individuals received more information about their own ability and willingness to procrastinate, they may be more likely to procrastinate less. For example, if individuals used apps or journals to track how much time they procrastinated or how they feel about procrastination, they may be less likely to hold off their work to the last minute. Such methods would overcome the problem of imperfect information. By contrast, the institutional model assumes that all social behavior is epiphenomenal and that underlying structures condition the viewpoints of human agents. If this model is correct, one might expect to see variations in how willingness and ability are structured in people of different institutions. For example, individuals in a private research university in the United States may have different reasons for procrastinating than individuals in a village in rural Indonesia. A related prediction is that employers, schools, and governments can implement policies to shape the willingness and ability of individuals to procrastinate. A school, for one, can send multiple reminders to professors to submit their grades ahead of the deadline. Doing so might decrease the willingness of instructors to wait to the last minute to grade their students' work.

Selecting and Fitting a Model

1. According to James et al. (2013), flexible models are those that can “fit many different possible functional forms for f .” Flexible models requires estimating a larger number of parameters. Flexible models can lead to problems of overfitting, where data follows the error or noise too closely. More specifically, overfitting occurs when a given method results in a small training mean squared error (MSE) but a large test MSE. However, even as flexible models have a higher variance (the amount by which f would change if we estimated it using a different training data set) than inflexible models, flexible models have a lower bias (error introduced when approximating a complicated real-life problem using simpler models). As such, how flexible a model should be depends on the sample size or number of observations (n), the number of predictors (p), the relationship between the predictors and responses, and the variance of the error terms. It will be relevant to consider the bias-variance trade-off.
 - a. A flexible model will be better than an inflexible model. The extremely large sample size n means that variance will be less of a concern. Contrastingly, the small number of predictors p means that bias may be more of a problem. As such, a more flexible model can use the strength of the sample (low variance) to compensate for the weakness of the model (high bias).
 - b. A flexible model will be worse than an inflexible model. The extremely large number of predictors p means that bias will be less of a concern. Contrastingly, the small number of observations n means that variance may be more of a problem. As such, a more flexible model may compound the weaknesses of the sample (high variance) and lead to overfitting.
 - c. A flexible model will be better than an inflexible model. Given that the relationship between the predictors and the response is highly non-linear, it would be preferable to have a model that allows for higher degrees of freedom (the number of smoothing splines or the flexibility of the curve). Thus, flexible models with larger numbers of parameters are required.
 - d. A flexible model will be worse than an inflexible model. Given that the variance of the error terms is extremely high, a flexible model would compound the weaknesses of the data by increasing the variance further, albeit with the benefit of lower bias. Overfitting might result.
2. As the flexibility of the model increases, the bias and training error curves decrease monotonically, the variance curve increases monotonically, the test error curve decreases then increases, and the irreducible error curve remains constant. The bias curve decreases because the increasing flexibility of a model allows it to take real-life complexity into greater account, minimizing the discrepancy between the model and the phenomena it represents. The training error curve decreases as well because the model is overfitting the data – it follows the errors or noise too closely. The variance curve increases because as models become more flexible, the change to the estimate of f increases in response to any changes in the observed data points. The test error curve depends on the relative rate of change of the increase in variance and the decrease in bias. Initially, the test error curve decreases because the bias tends

to decrease faster than the variance increases. However, after a certain point increasing flexibility has little impact on the bias but starts to significantly increase the variance. This causes the test error curve to increase. The irreducible error curve remains constant because of the fundamental statistical assumption that variance is inherently a nonnegative quantity.