PS1_Jannik

2.1

a)

$Y_i(0)$ is the potential outcome for the unit *i* when the unit *i* is not exposed to the treatment. It is a *potential* outcome since it informs what would happen if a treatment were not assigned.

b)

$Y_i(0) \mid D_i = 1$ denotes the untreated potential outcome for at unit *i* who would have been treated under a *hypothetical* allocation of treatment.

In contrast $Y_i(0) \mid d_i = 1$ is the untreated potential outcome for at unit *I* who *actually* receives the treatment.

c)

$Y_i(0)$ is different from $Y_i(0) \mid D_i = 0$ since the first notation is the untreated potential outcome for *everyone* whereas the second notation describes the untreated potential outcome for a subject who would not be treated only under some hypothetical allocation of treatment

d)

The meaning of $Y_i(0) \mid D_i = 1$ is different from $Y_i(0) \mid D_i = 0$. There are both the untreated potential outcome for the unit *i* but under two different hypothetical scenarios – respectively a scenario of allocation of treatment and no allocation of treatment.

e)

$E[Y_i(0)]$ has a different meaning than $E[Y_i(0) \mid D_i = 1]$ since the first expression is the expected outcome for unit *I* given the subject has not been exposed to treatment whereas the second is also the expected untreated outcome but only for a subject who would be treated

under some hypothetical allocation of treatment. The term "expected" means that the subject i has been sampled at random.

f)
The selection bias term in the equation equals zero since the allocation of the treatment is completely unrelated to the potential outcomes since the assignment is based on randomness. Therefore the two expected potential outcomes $E[Y_i(0)]$ are the same on average and subtracted from one another they cancel each out and the selection bias term equals zero.

2.10

a)
If the treated students are told beforehand why they receive the newspaper, it threatens the excludability-assumption since we would not know whether a possible treatment effect is due to the newspaper or whether is the due to the disclosure in it self. Therefore the causal effect is not isolated to receiving of a newspaper since there could be an effect in itself by knowing that you are part of an experiment (hawthorne-effect). Therefore the potential outcome of the treated (those who receive a newspaper) might be higher(or different) than the potential outcome of the students in the control group.

 Knowing that you receive a paper with the purpose of larger political interest might also trigger some side-effects like following politics more through television and so on.

b)
If the papers are read by other students from the control group this will challenge the non-inteference-assumption since there will be a spill-over from the treatment and controlgroup and they will be mixed. If this spill-over is systematical (e.g. students who have academic parents) are more likely to read the papers in the cafeteria this will create a bias, since academic children typically are more political interested as well. We want to be in complete control over who are assigned to treatment and who actually receive it, otherwise it will

undermine (add bias to) the causal effect, since this interference might by systematically dependent on other student characteristics which will create self selection bias.

2.12

a)

We cant expect that the potential outcomes are the same for the treatment and control group since we do not know whether the assignment of the treatment is based on randomness or not. The problem is that the prisoners have self-selected into treatment and from the beginning are better readers than the control group. There could be confounders which explain both reading ability and tendency towards violence. Moreover there is a problem is terms of reverse causality. So we might overestimate the effect of reading on violence since some of the effect can be ascribe to the fact that violence also effects reading. Therefore the two groups are not the same and have different potential outcomes and the treatment effect might be biased.

b)

We do not know if it is a causal effect of reading that reduces tendency towards violence or whether it is due to something else. It might be that the treatment effect is not due to reading but due to the fact that they the treated prisoners build up some peaceful rutines – a by-product of the treatment but which is not directly related to the treatment.

c)

The assumption of non-inteference is in risk of being violated since the control group might be very aware of the treated prisoners and might be inspired themselves to read more. As a consequence there is a spill-over from control to treatment-group.

d)