

**CS112**  
**Causal Inference Assignment**  
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**Fall 2018**

## Link of Code

<https://drive.google.com/file/d/1VvRxqQiMicCrJSWHxaSUxPRHHUDTVVd2/view?usp=sharing>

## Question 1

Debugging--in the 3 cases below (a through c), identify the major coding error in each case and explain how to fix it, in 1-2 sentences. DO NOT actually copy/paste corrected code:

**(a)** <https://gist.github.com/diamonaj/2e5d5ba5226b7b9760f5d1bf1e7bf765>

The process of Match() is missing for the code. Genout only means the weighted matching parameters, which makes no sense when the process of matching is missing. Therefore, we should add a line after the first line: *mout <- Match(Tr=treat, X=X, M=1, Weight.matrix = genout)*. Meanwhile, change the Matchbalance() so that match.out=mout.

**(b)** <https://gist.github.com/diamonaj/3b6bc83d040098486634184d99fc4c55>

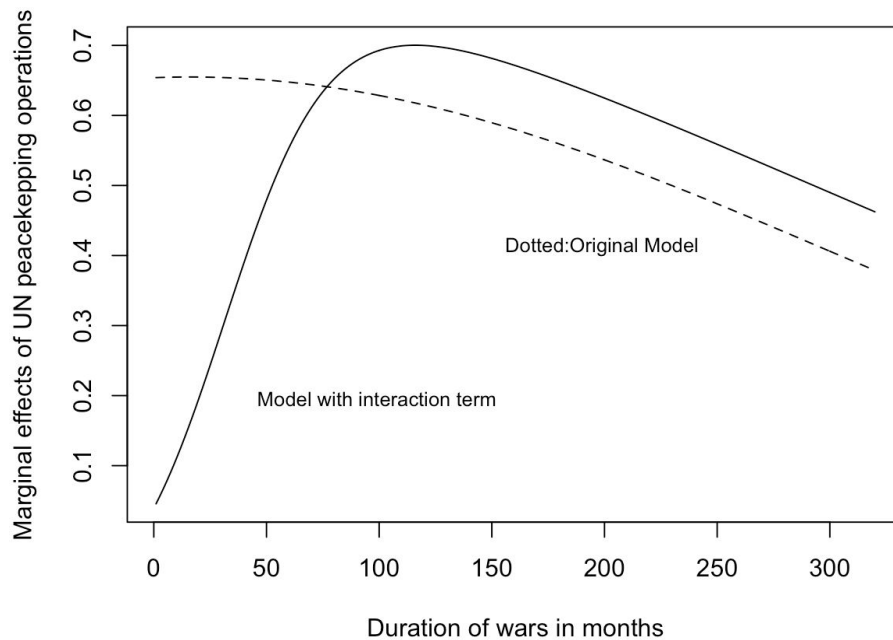
In the GenMatch(), we use "ATE". Therefore, we should also use "ATE" in the Match() function. Otherwise, it may lead to problems since the weights we get from GenMatch() using "ATE" can only be applied in Match with "ATE". We should add *estimand="ATE"* into the Match() function.

**(c)** <https://gist.github.com/diamonaj/a88cb40132ed8584e5182b585e1c84c8>

In Match(), we use M=2 to do matching. However, in GenMatch, we use M=1. This inconsistency will lead to the problems in results. Therefore, we should add *M=1* into the GenMatch() function.

## Question 2

Replicate figure 8 in <https://gking.harvard.edu/files/counterf.pdf>.



Causal Effect of Multidimensional UN Peacekeeping Operations

## Question 3

Define treatment as below:

```
Tr <- rep(0, length(foo$untype))
```

```
Tr[which(foo$untype != "None")] <- 1
```

What does this mean? What is "treatment"?

In `foo$untype`, some of the data are "None"s, which means that there are no intervention from UN in this war; some of the data are the types of the interventions. Therefore, we transfer "None" to 0 to mark the wars in control group, and transfer non-"None" to 1 to mark the wars in treatment group. The treatment is intervention of UN.

## Question 4

Let's pretend you work for an NGO and your manager asks you to estimate the impact of the treatment identified above on lenient peacebuilding success 2 years and 5 years after the war. You will have to search for these two outcomes variables in the codebook.

(a) In no more than 1 sentence, articulate the causal question as best you can (being as clear as you can about treatment and control):

How do the multidimensional peacekeeping activities conducted by UN influence the lenient peacebuilding success 2 years and 5 years after the war. (Treatment: untype=1; Control: untype=0)

(b) In no more than 1 sentence, explain how/why SUTVA might be violated here. In no more than 1 additional sentence, explain how you could in theory use the "restrict" argument (in Match()/GenMatch()) to help address this potential problem.

There may be some wars occurring in the same country, in which scenarios the intervention of UN in a war will influence the results of the other wars. Therefore, we can use restrict argument in the Match() function to exclude the wars that happen in the same country from the Matching process.

(c) Use simple logistic regression, propensity score matching, and genetic matching to try to answer these questions.

	Tmt Effect (bias)	Tmt Effect (no bias)	p-value
Logistic Regression			
Success 2 years	NA*	0.1740779	< 2.22e-16
Success 5 years	NA*	0.2020409	0.00010717
Propensity Score Matching			

Success 2 years	0.19466	NA**	0.098
Success 5 years	0.39389	NA**	0.006
Genetic Matching			
Success 2 years	0.20761	0.25	0.272
Success 5 years	0.23985	0.15152	0.31056

\*No need to provide bias-adjusted results for logistic regression--only for matching estimates.

\*\*Only provide a treatment effect for matching results if your leximin p-value is above 0.10.

Functional forms of propensity score model:  $Tr \sim \text{wartype} + \text{logcost} + \text{wardur} + \text{factnum} + \text{factnum2} + \text{trnsfcap} + \text{treaty} + \text{develop} + \text{exp} + \text{decade}$

Variables for GenMatch: wartype, logcost, wardur, factnum, factnum2, trnsfcap, treaty, develop, exp, decade

MatchBalance Variables: wartype, logcost, wardur, factnum, factnum2, trnsfcap, treaty, develop, exp, decade

## Memo

From: Yuhao Chen

To: António Guterres, the Secretary-General of the United Nations

Subject: A way to heal the world

To study the effect of the intervention of UN, I used logistic regression, propensity score matching and genetic matching to understand the treatment effect of the intervention activities. By applying the most accurate GenMatch method, I found the interventions of UN lead to an approximately 20 percent of increase in the lenient peacebuilding success 2 years and 5 years after the war. This means the intervention of UN has a prominent positive influence on the situation of wars. Therefore, UN should insist on conducting activities in war areas to stop the wars.