**Part 1.**

**MMR vaccine and autism – article discussion**

Read the article *“Communicating science to the public: MMR vaccine and autism”* by Paul Offit and Susan Coffin, Vaccine, Volume 22, Issue 1, 2003, pp. 1-6 (access it through Dixson library) and be ready to discuss the following questions during your assigned practical session in Week 11. There is an online forum available for off-campus students to contribute their responses.

**Note:** The original paper by Wakefield et al (1998), cited in Offit and Coffin (2003), was retracted by the editors of the Lancet journal in 2010, 12 years after publication.

Discussion questions

1. What does the first quote mean? ‘Popular induction depends upon the emotional interest of the instances, not on their number.’ - Bertrand Russell (1927)

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1. What did Wakefield do in his study?

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1. What would make good controls? Who do the children in the study need to be compared with to explore links between MMR and autism more convincingly?

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1. How can we test whether the MMR vaccine causes autism?

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1. What is the conclusion from the many big nationwide, multi-year, case control studies and association studies that have tested the hypothesis that the MMR vaccine causes autism?

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1. Can we conclude that the MMR vaccine never causes autism?

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***Part 2.***

Three different doses of a herbicide are applied to cotton crops in four different locations. The four fields available for testing have fairly uniform characteristics (size, moisture, fertility, etc.), although there are some differences between the fields. Each field is divided into 3 equal sized plots, with low(=1), medium (=2) and high (=3) doses of herbicide assigned to the plots at random.

**herbicide**  1 2 3 1 2 3 1 2 3 1 2 3

**location** 1 1 1 2 2 2 3 3 3 4 4 4

**yield**  12.7 15.2 12.3 13.0 16.2 9.4 15.6 13.7 9.1 7.1 7.8 4.7

1. Completely randomized design (CRD).
   1. Plot the means and confidence intervals using the following R code.

library(effects)

CRD.eff<-allEffects(lm(yield~herbF)))

plot(CRD.eff)

What conclusion would you draw?

I see an decrease in yield associated with an increase in herbicide. A negative association. There is also greater variability the further from the middle you go.

* 1. Run the analysis as a completely randomised design (no blocking effect).

Produce the anova and summary tables and give an informative conclusion.

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1. Randomised complete block design (RCB)
   1. Plot the means and confidence intervals.

RCB.eff<-allEffects(lm(yield~location+herbF)))

plot(RCB.eff)

What conclusion would you draw?

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* 1. Now run the analysis as a randomised complete block design.

Produce the anova and summary tables and give an informative conclusion.

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1. Compare the anova tables for the two analyses and explain the effect of including blocks.

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1. Give an informative interpretation of each of the coefficients (the actual value and the corresponding p-value) in the summary table for the RCB analysis.

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