**Week 4 Stats, Monday**

Announcements/Questions:

* Stats Reading getting a little heavy? Stats Main Page has pages to emphasize!
	+ This week: Ch. 7 (it’s short & sweet). Priorities (most to least important)
		1. pp 162-182, 200-204 – the bestiary
			- categorical x, continuous y - ANOVA 1-way layout
			- categorical x, categorical y - tabular designs (week 7?)
		2. pp 182-194 - ANOVA 2-way layouts, split plot designs, 3+ factors
		3. pp 194-200 – experiments over time, fully crossed design (experimental regression)
* *Stats Syllabus* redone as blogs page (not doc)
* No class Wednesday (Day of Absence) – see week’s schedule for activities
* OK to post .docx lecture notes instead of .pdf’s?
* Evergreen grad (UMass/Amherst grad student) questioned stats of eminent Harvard profs!

Today

* Type I and Type II Errors ( Ch. 4 )

|  |  |  |
| --- | --- | --- |
| **Your choice****In the real world**  | **Retain H0** | **Reject H0** |
| **H0 true** | Correct Decision | Type I error  |
| **H0 false** | Type II error  | Correct Decision |

I

Examples:

* + What is our H0 for anthropogenic Climate Change?

If indeed climate change is anthropogenic, and we incorrectly fail to reject a false H0. We retain the null hypothesis and do nothing to slow climate change
we have committed a Type II error. This is indeed grave.
In this case, we want a high β, and are willing to sacrifice α

“Precautionary Principle”

* + Similarly, what is your H0 for a new chemical pesticide?

Assume it does no harm until proven otherwise?

* + Analogy to “producer” vs. “consumer” errors.
	What does this mean to you, as a consumer?
* p-values vs. power – α vs. β
Parametric statistics tend to control α, the probability of a type I error
an inverse, but not simple relationship.
typically, you’ll need a larger n for greater statistical power (or will have to relax p)

p. 103, figure 4.5

* Ch. 5: The 3 Frameworks (Parametric, Monte Carlo, Bayesian)
	+ parametric vs monte carlo
	+ next week – something about Bayesian
* Ch. 6: Field Experiments
	+ What makes a good study design?
		- Recognizing a bad one….
	+ Basic kinds of field experiments
* Ch. 7: Bestiary of Experimental and Sampling Designs (see slides)
* T-test – comparing 2 means
	+ Independent samples, randomly selected
	+ Drawn from a randomly distributed population
	+ Student’s (Gosset’s) t-distribution (2-sample t-test t-tables)
		- For tcritical, need p-value & degrees of freedom (n1 + n2 -2)
	+ Example p. 109 (#ants in field vs. ants in forest)
	+ H0 :
	+ Ha :
* ANOVA – comparing more than 2 means (chalk talk – next week)
	+ H0 :
	+ Ha :
	+ assumptions for parametric ANOVA–
		- normality (Shapiro-Wilks test)
		- equal variances (Levene’s test)
* Discussion: Parametric vs. nonparametric ANOVA
* **Advanced ANOVA topics – deferred to Week 5**
* **Standard Deviation vs. Standard Error (vs. Covariance)**



* To review for next week’s quiz? What to expect next week? A take home exam?