15.301/310, Managerial Psychology
Prof. Dan Ariely
Recitation 7: Experimental Design

Start day – why experimental design so important

Imagine you work for Slimfast, trying new diet product line
Milkshake, ice, powder, milk replace entire diet for month

What is market share?
You in charge – figure out what demand will be in market. How going to do it?

-similar products
Nothing similar
This only where mix milk and ice, but supposed to lose 2x weight

-hire research firm
Ok, you're research firm now, what are you going to do?
-not know about food products
What would you ask, how would you ask people?

How would you do it

-ask about consumption of milk, if want to
They say love milk, want to lose weight. Going to buy product?
-no, but starting pt

Give $10 ask if willing to trade for product

Initial purchasing, not long term

-give sample

Predict before have for market, spend money to develop

Work marketing firm or not,
Somebody come to you at some pt in life, say we asked people how much they would buy this product for, they said very likely, and for $500

You have to think carefully about how survey was designed, what are questions, what does it mean, how were people interviewed, who wrote it, what was the sample
Think all these considerations, take numbers you get, transfer to something meaningful
Common challenge, Much like technology

Figure out how do it, how interpret numbers

Hope you get better idea of how to take raw numbers and how to interpret them
Today, watch a struggle to present DVD on screen☺
We might be successful

Ad, stand in front of group of people, nothing coming
Audience shouting "try config.sys," etc…
One says– get an apeoplee

How many of you doing surveys vs experiments?
Surveys? Experiments?
What is the difference between survey, experiment?

-Experiment, not measuring preferences, but actions
no
-survey observations, experiment variables?
No, like example, experiments observe

-experiment, actually observing?
No,
My advisor used to say, couldn't be more wrong.
I haven't had a chance to use this in class yet, but I'm going to.

So, the big difference
Survey, one state one cell design, measuring only 1 thing.

Look – how large is portion of pasta in cafeteria. Experiment? No, a study, measure only 1 thing, only 1 parameter

In experiment, we change something.

See if weather outside changes portion of pasta in cafeteria
If people know cook, changes portions?

Survey -1 cell
Experiment – multiple cells

Reason to have multiple cells, want to manipulate cells, gives us a way to know causality of the effect

Here is a study, one cell. Read and quickly answer. (survey)

…
Rate Hershey's Kiss liking
Which animal?
How many to trade for animal?
…

What do you think this study is about?
Anybody?

-quantify preference through Hershey kisses
Yes
In general, is this a worthwhile study?

Say dif is 8. is it a worthwhile study?

So, this is not sensible study if want estimate parameter
What we want to see here is if
amount of Hershey's kisses correlated to how much one likes Hershey's kisses?

People who like them a lot ask for more or less in trade for the animal?

Who thinks ask less? More? Same amount?
Why more?

-try to get more out of trade

Assuming everyone likes stuffed animal better, people who like Hershey's Kisses more will get more out of each one, value higher, so ask for less

Even though single cell design, might be able to make some sense from it. Why? We had a strong theory that people who like Hershey's kisses more will ask for less kisses

Single cell design Useful to extent parameter interesting or have strong theory

Strong theory, have prediction. If doesn't follow, disprove theory.

Most useful about Experiment – show causality. The question is how to design them
Hard to say

What is an elegant experiment?
When see it, know it's elegant
Like a picture, you look and say, I like that. Very hard up front to say what to do to make it beautiful

In general good experiment controls for everything else, only change the one thing you are interested in. rest about aesthetic value

Example from book of Judges, chapter 6 "the first experiment" (slide)

Gideon wakes up, hears God telling him to save Israel

He says, this sounds like a dangerous task, it's not every dream that I have that I follow it right away
Be a bit More cautious, let's do the experiment.
God, prove to me that this is the case.
He is Designing first condition of experiment
Puts wool on floor. Says, if wool wet and rest dry, we are getting somewhere
Got up next day, Experiment worked – was he happy? Not yet
Why? He has not tried this before, maybe it always turns out that only the wool will be wet with dew. He was quite sophisticated experimentally.

Ok, let's do opposite condition, that would be the most discriminating, wool dry, rest wet with dew

Now Gideon happy
Controlled, did condition, opposite condition, worked out
Now I know something else must be causing this
2 conditions, 2 cells
This is Example for a good exp

Many times, want do multiple exp
Series of exp – try get logic across to figure out pt
No experiment can be perfect
Build case through multiple attempts

Single cell designs

So we said single cell designs not experiments, but studies
Can set parameters, test theories

Think about way single cell design, measuring one thing, but can say something

Example: I first came to MIT, following experiment -
Went to Chapel Hill where I studied psychology
Brewery, let us be waiters for 1 week
We were tasting waiters
Beers to taste, described, what would you like to try?
Table by table
Some gave menus, told to mark
Brought beer, ask how much like beer and if they regret making that choice

Wanted to look at if when people make decisions one after other, if influenced by the other people

More or less like other people?

Seeking variety or seeking conformity?
How many people think conformity? variety?

variety
Same experiment in Hong Kong – conformity

That's not the ptoin, it's if people before you can change what beer you get, and you might not like it very much

Here's what happened
People who ordered out loud less happy
Why? If you ordered Summer Wheat, and I don't order Summer Wheat because of that, I order something I like less, I just took a hit on my preferences
Wasn't true 1st person
1st person ordered happiest

2 conditions

Also ask another ?
People who ordered regularly – too much or too little variety?
What's the standard?

Created Simulation
Took all people's data, assigned to random tables, what would be average variety?
Compare to actual variety in table

Think about it in a way, Take experiment, create some standard

Turns out, people had too much variety

Paper on my web site
Example of take single cell and create some rational standard

Random Assignment

One of the most important things. Talked about it 1st week w/ causality, correlation

Experiment, people doing 1 or 2 things
Want to be sure 2 groups differ only on manipulation

Say sing for 5 min or poetry 5 min, then ask about careers
See if singing out loud changes what we think about possible careers

If don't have random assign, instead let them choose, cannot attribute effect on career choice to anything about the act of singing
Might be self selection

Random assignment very important
Make sure groups same on everything else
Most importantly, because of that, direction for causation
Everything same, controlled, thing different caused by manipulation

Now, do experiment
Will be a great experiment
Fast, pay attention
Face you prefer – 5s look, 2s choose
Mark on paper, series of options
…

Ok, what did you notice happened here?

-faces recycled
-same comparison made
No, not same, but against others
Why did that?

-if prefer somebody, see if prefer over third

What we are looking at is called transitivity
When prefer a to b, b to c, but c to a
In general when prefer a to b, b to c, also have to prefer a to c
Wanted to see if people violate transitivity
If violate, means preferences are very hard to come by
We asked people to answer 1 of 2 ?s
Who do you like more, or who is happier

What we want to look at, is
What is easier, what do people make less mistakes in?
Like more, or who is happier?
If one more collective transitivity in one than other, can say which is more difficult
Consult own preferences, or look in external world?

One factor design – manipulate only 1 thing
Have level one, level 2, effective measure. Could be more levels, but one factor
Could be, see if people violate transitivity more levels than 2, but one factor

-I don't know
Wearing hat backward
Could ask if people smile at you more w/ hat backward or forward. One factor design.
Why? Manipulate one thing. Backward vs forward

-3 types testimonials, neutral, positive, balance

Think about ad for presidential election, negative and positive ads. Could look at which is more effective

Could say, what motivates students to study, possibility of A or fear of F?

Manipulate 1 thing, considered 1 factor, any number levels
Students study, can have parents call, peer pressure, fear of failing, all kinds of things

Can test all things to affect 1 thing – one factor designs
A lot of manipulators, but one factor design

In contrast, multiple factor design
Take hat example, factor 1 wear hat fwd or bkwd. Factor 2 - we have the hat be Red Sox or Yankees

Full factorial design

Motivate students do well by frightening or encouraging,
Add something else to it
Classical music or war marches

When cross all levels, multi cell,
Multi factor design

Single fact des not capturing complexity of real life

Studying not only driven by grades, but social pressure

Could say Fear vs hope and Parents call y/n

Think 2 things could work together
Parents call and fear worst performance?

Want multiple

Story:
PhD joint computer, psychology, in same lab. My professor comes in with wife
Ask beer, hello Dan, how are you, graduate? Yes.
Something wrong, right? This guy graduated w/ PhD, only get job serving beer?
Had to write him afterwards, explain

Say did something, high energy, low energy music
Theory, low energy better performance
Gender 2 more than gender 1
2 effects, both work, work independently
Could test separately

Ordinal interaction – both increase, but more for 1 gender

Not just additive

Small difference in low energy, but big w/ high energy
Woman and high energy,

Also have disordinal – one effect one way, other effect other way
Men positively affected by music, women negatively

Difference for how interpret results

All these interactions is the reason we do multi factorial designs

Interested to find out why we have reactions so much?
Not only tell us effect works, but also when effect doesn't work
Usually feel we understand something better when we know when it works and we know when it doesn't work

Example, motivate people to come to class, all kinds of things we can do
What could I do to have no effect?
Have effect working and have it not working

Another topic
within vs between subject designs

within – subject or subjects in multiple conditions
experiment we did, between subject design - some asked about liking, some asking happy

could have been within subject design, 15 pairs happier, 15 who like more

-within design, becomes apparent to subject what experiment is about
Disadvantage, what is the advantage?

-lot of variables get automatic controls
All kinds of variances, all have preferencess for like and not like

Could Run experiment, give shock, erase memory, try again – not very common

These are advantages and disadvantages, there is not one that is better
Experimental design is the design of structure of the experiment
What cells we have, what factors, what are we measuring?

Started in agriculture, figure out what gave more yield

Fields of wheat – had to fig out what worked
Fertilizer, no fertilizer, sun, no sun
Divide field into small parts, cells, try different things

Reason for cells in design
Figure out which one worked, how they worked

Summarize, then show you a great movie
Experimental design is about laying groundwork, rules for how exp will work
Think about single factor/ multiple factor
All interactions? All cells?

Next week
Will talk hypothesis testing
Do experiment, one of cells different
Nothing would come up exactly same twice

Statistically significant – how decide when something is significantly different?

Short survey

2 experiments Pen and Teller conducting, find out if Feng Shui works or not
Second, bottled water

Episodes:
Pen & Teller, *Bullshit*
-Feng Shiu
-Bottled water