experiment sandbox

resource: experimental design 4 the life sciences 4e

@cjlortie

recipes for better blocking

blocking uses a variable to design that is likely to introduce variation into outcomes

blocking is a matched-subject design

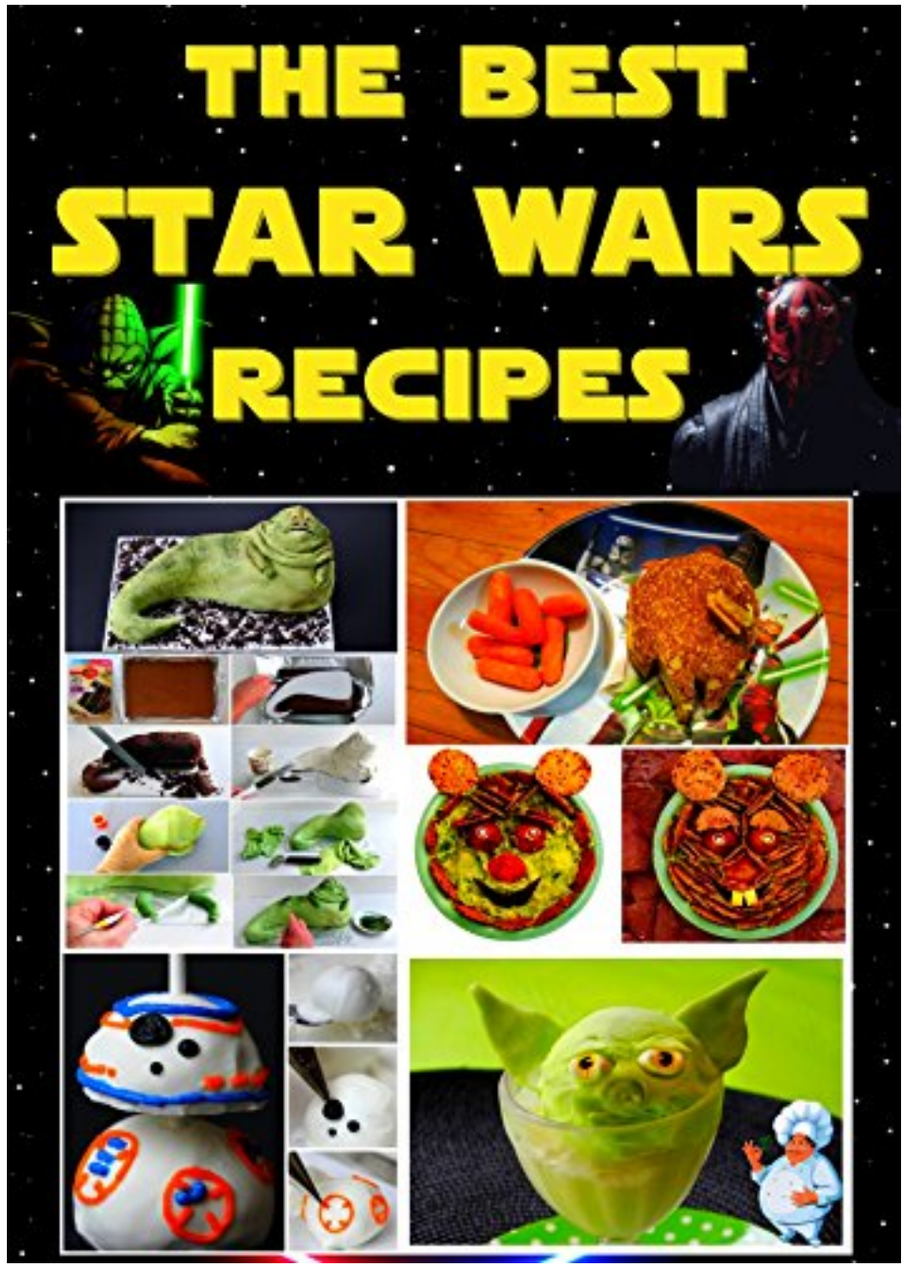
identify similarity in subjects, samples, environment
and distribute into groups if needed

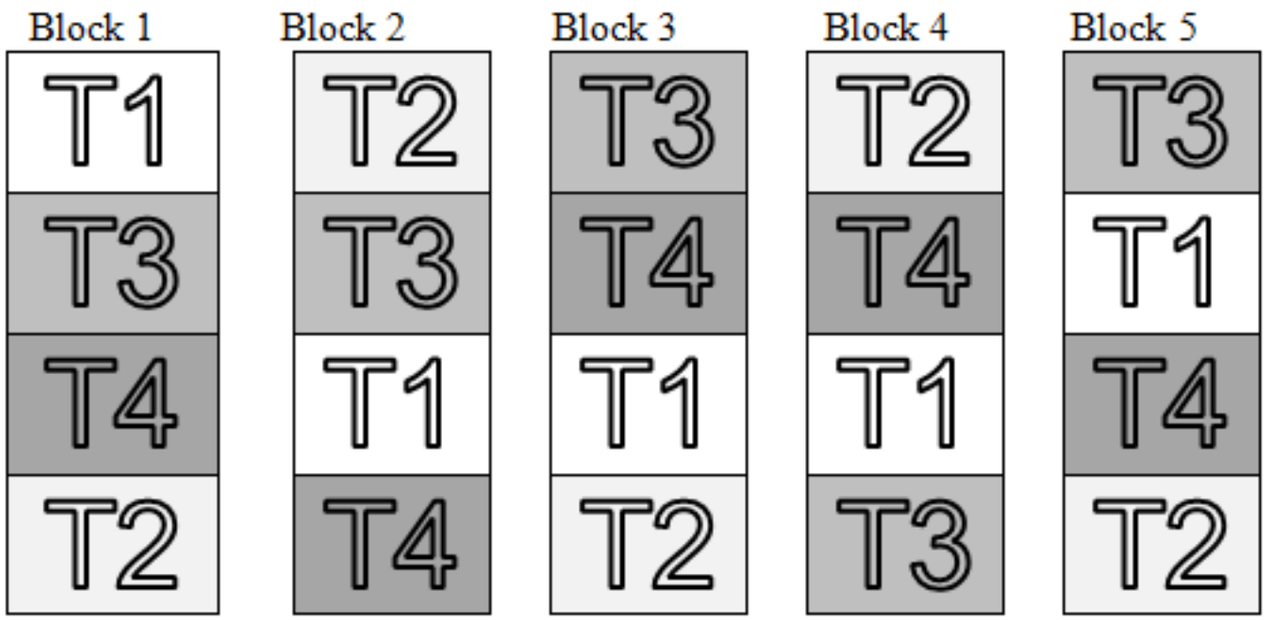
primary goal of better blocking is to use as a mechanism to partition variation

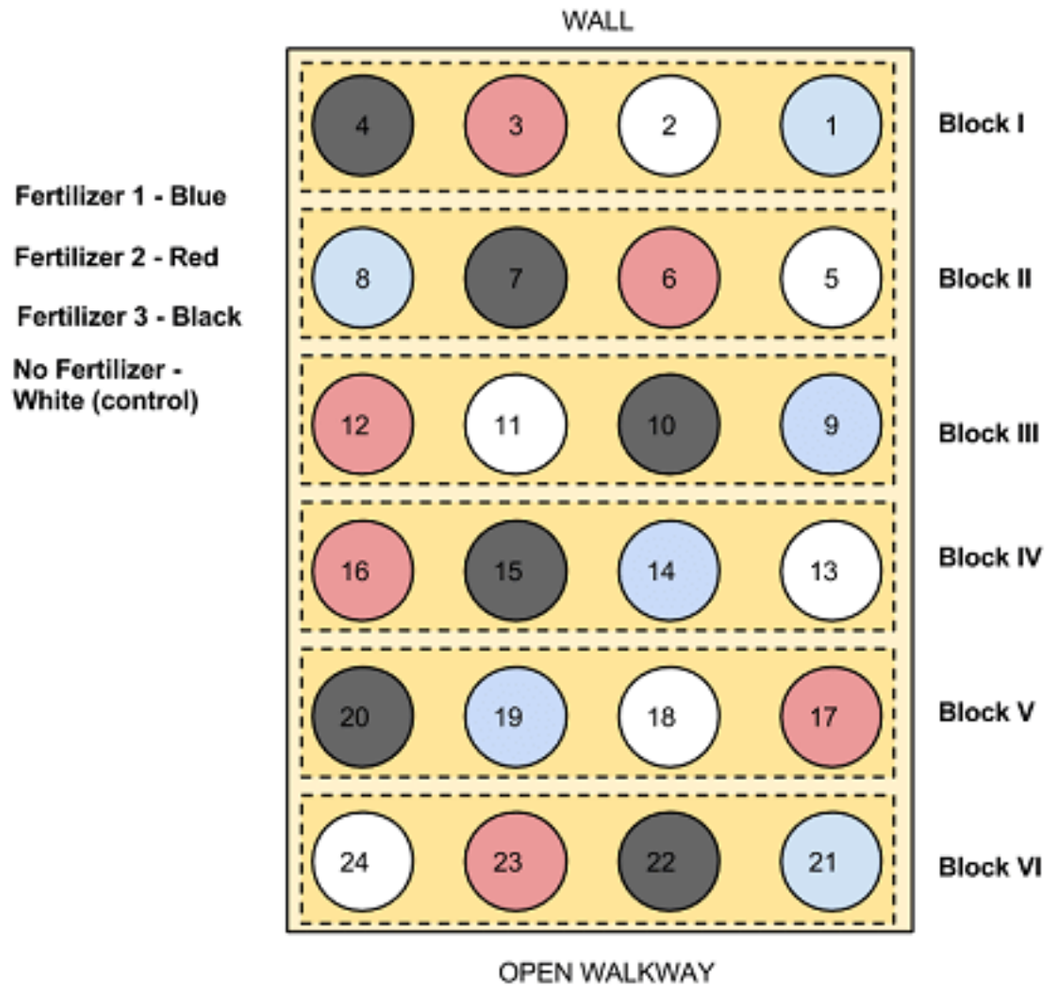
blocking can increase statistical power

recipe for blocks

1. seek similarity
2. consider key characters
3. block by space or time
4. explore power
5. mix equal numbers across blocks
6. paired design appetizers
7. ensure blocks are different




Block 1
T1
T3
T4
T2
Block 2
T2
T3
T1
T4
Block 3
T3
T4
T1
T2
Block 4
T2
T4
T1
T3
Block 5
T3
T1
T4
T2

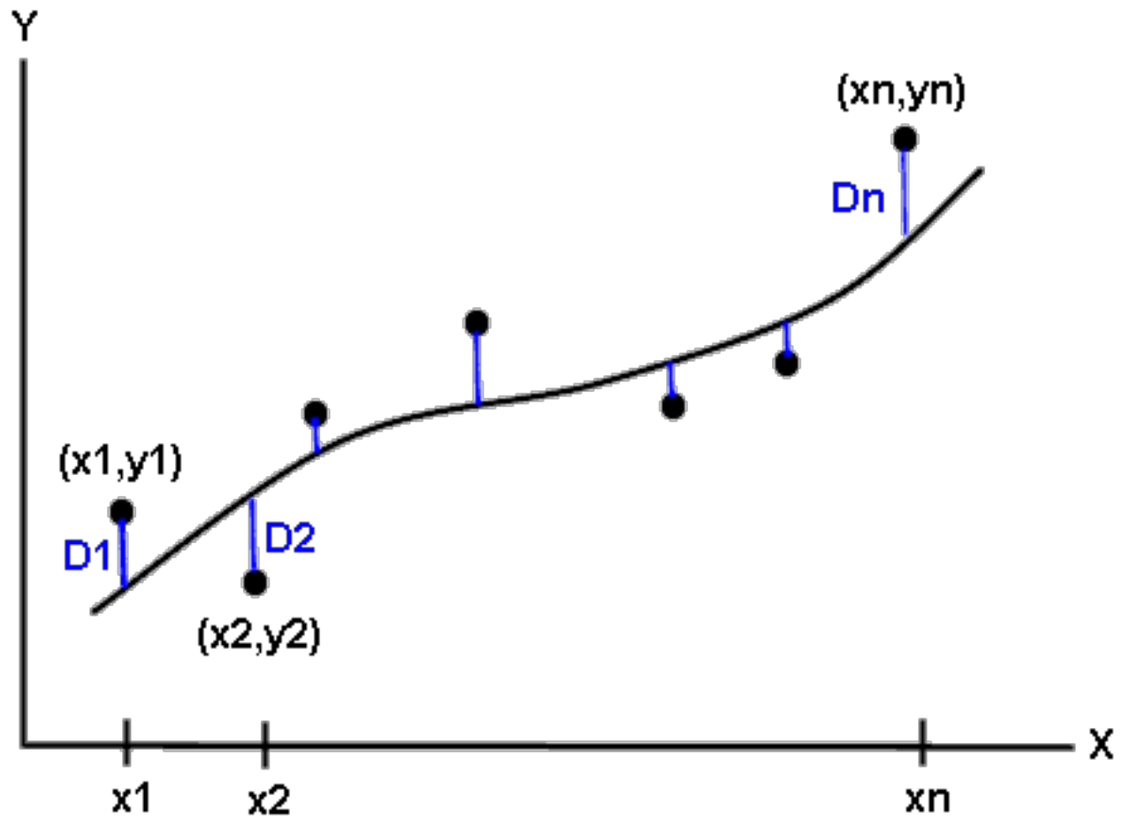

WALL
Fertilizer 1 - Blue
Fertilizer 2 - Red
Fertilizer 3 - Black
No Fertilizer - White (control)
4
3
2
1
Block I
8
7
6
5
Block II
12
11
10
9
Block III
16
15
14
13
Block IV
20
19
18
17
Block V
24
23
22
21
Block VI
OPEN WALKWAY

when not to block

power decreases
blocks too similar
limited replication possible

other key variables are continuous
(and not easily chopped up)

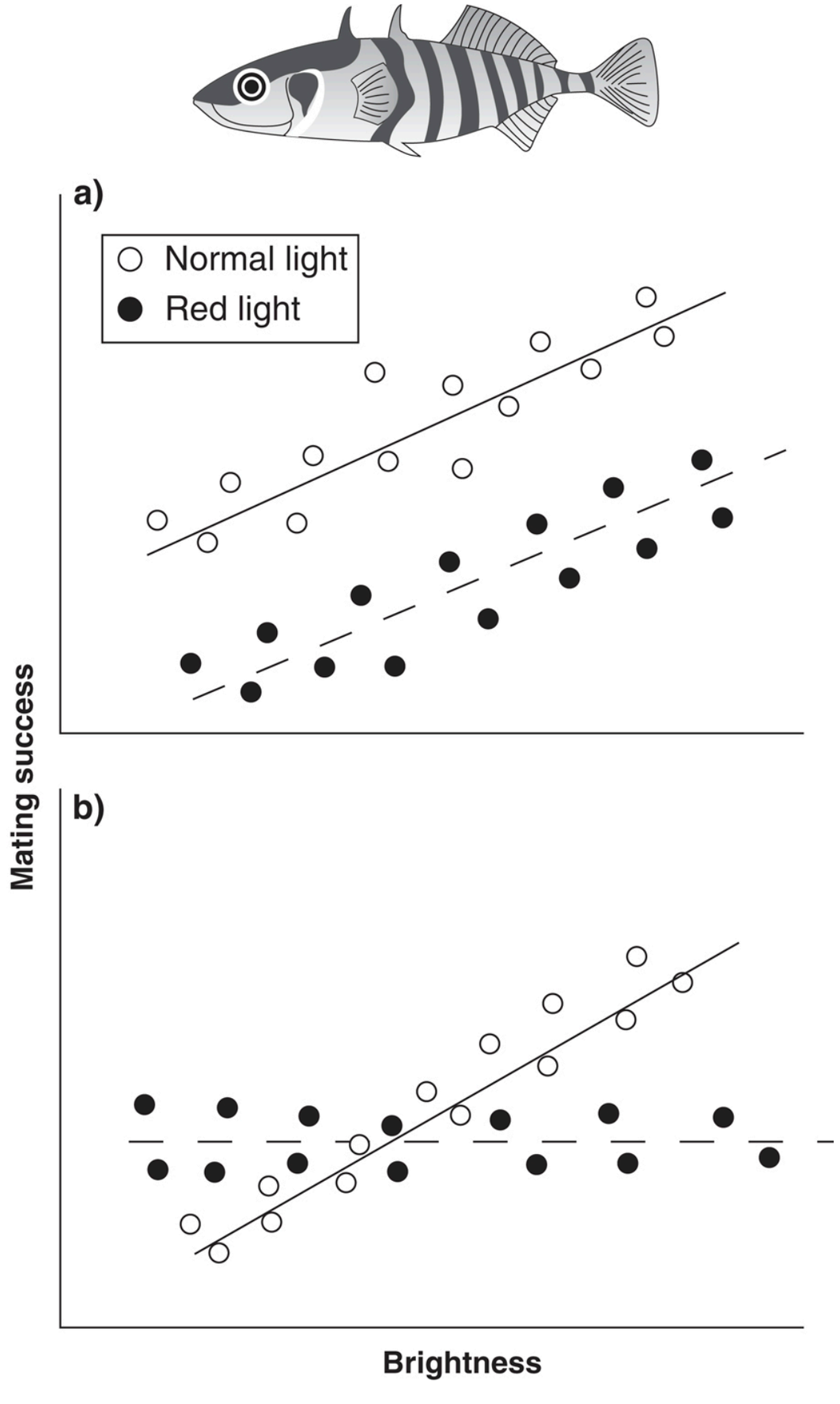
covariates are continuous variables that vary within subject/sample pool

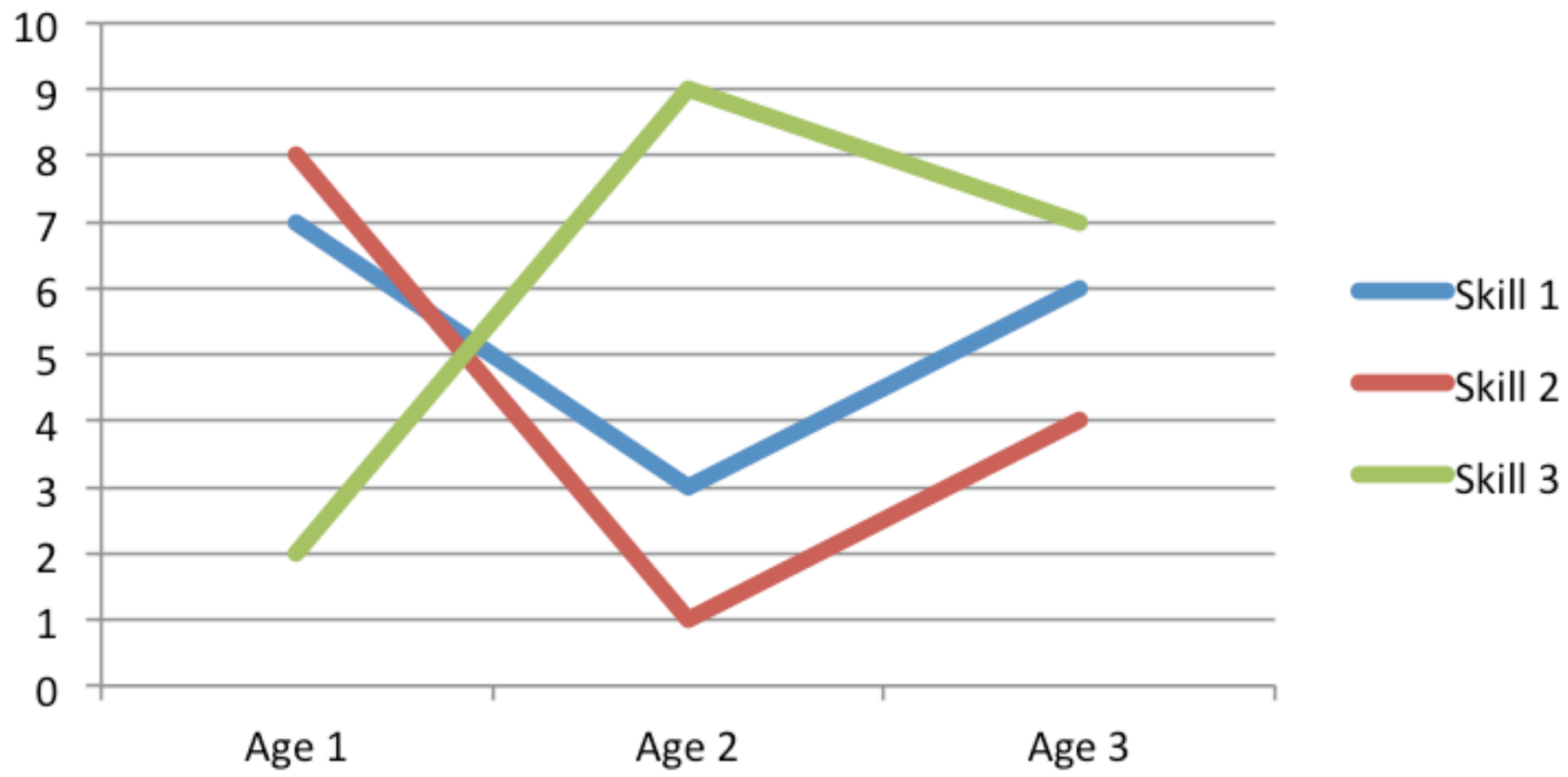


if covariates are unexamined/ignored,
residual variation will be difficult to interpret

recipe for ideal covariates

1. continuous
2. simple linear relationship with key variables
3. homogenous effects (i.e. no interaction terms)
4. design to ensure the extent of overlap between covariate and factor have the capacity to detect interactions statistically


a)
Normal light
Red light
Mating success
b)
Brightness


10
9
8
7
6
5
4
3
2
1
0
Age 1
Age 2
Age 3
Skill 1
Skill 2
Skill 3

interactions can be
sign, slope, strength

cautionary design (baking) note
ensure reps are adequate per block

implication use observable trait variation to your advantage