

Discontinuous Growth Modeling

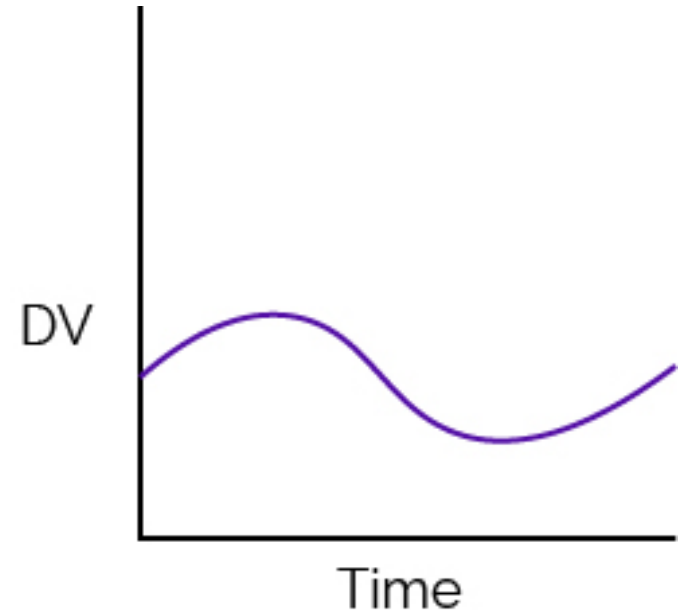
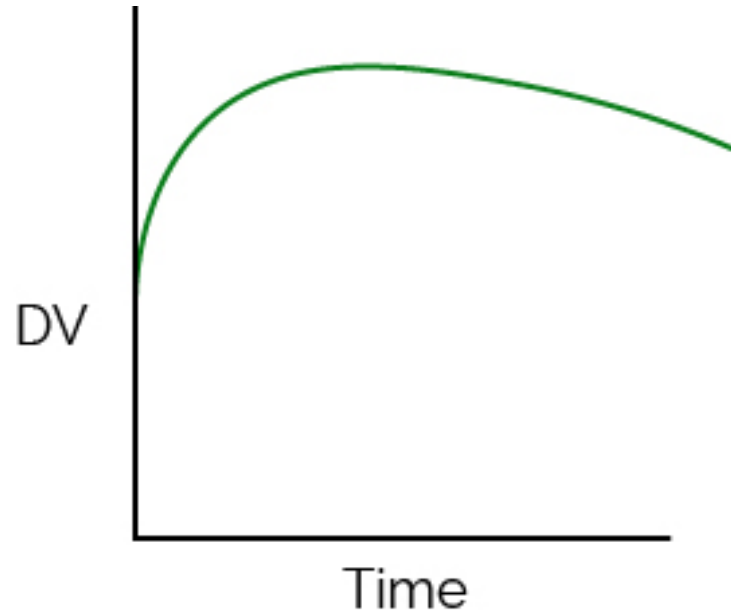
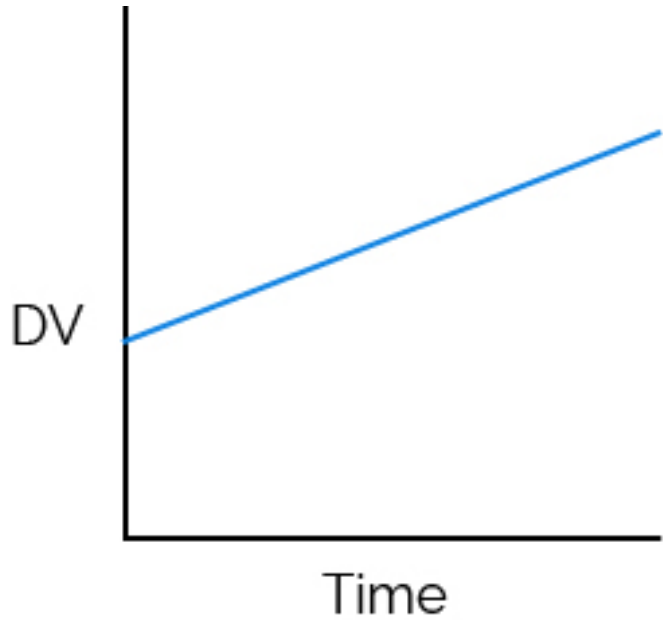
KELCIE GRENIER

SPRING 2018

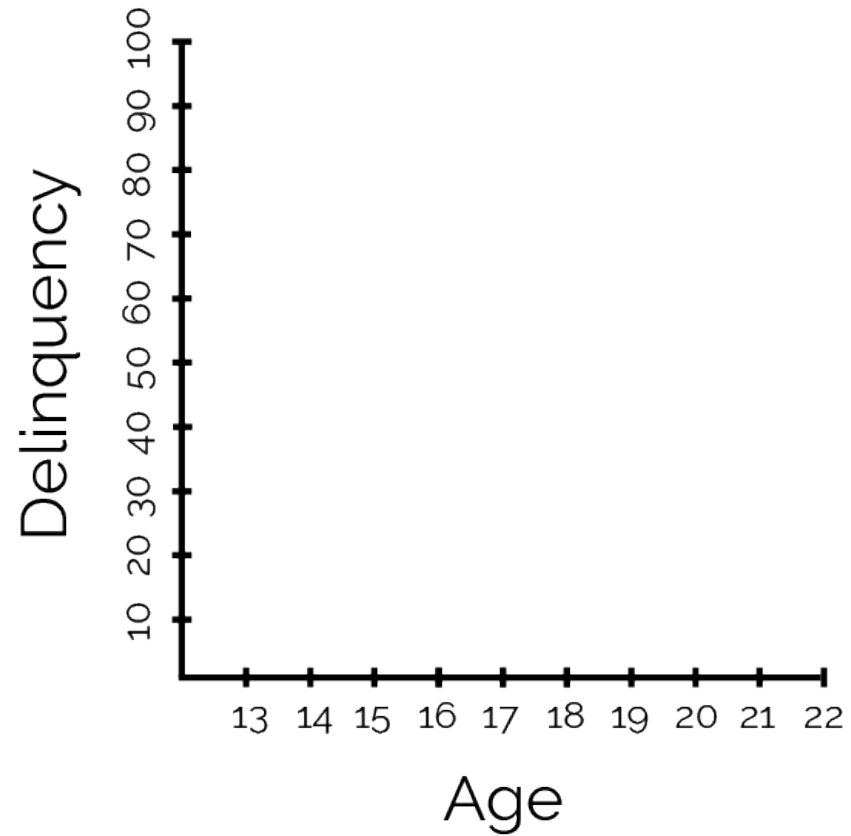
Resources on
Github



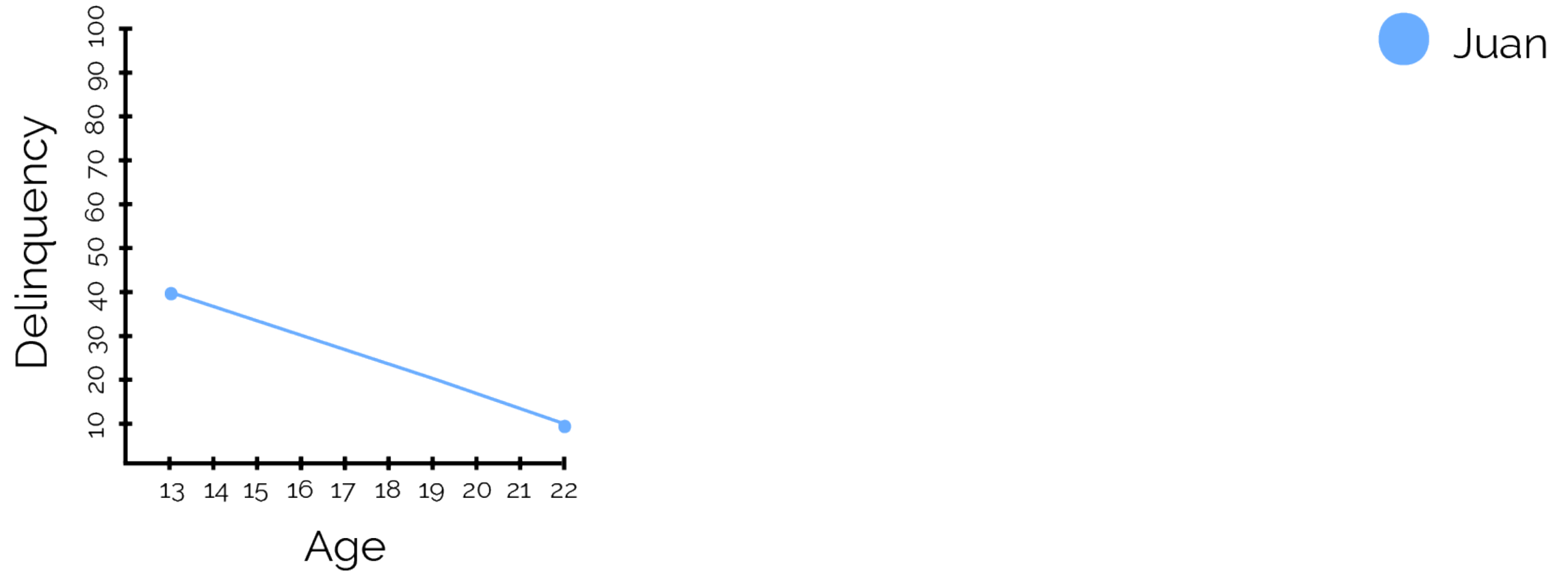
Recap Growth Modeling



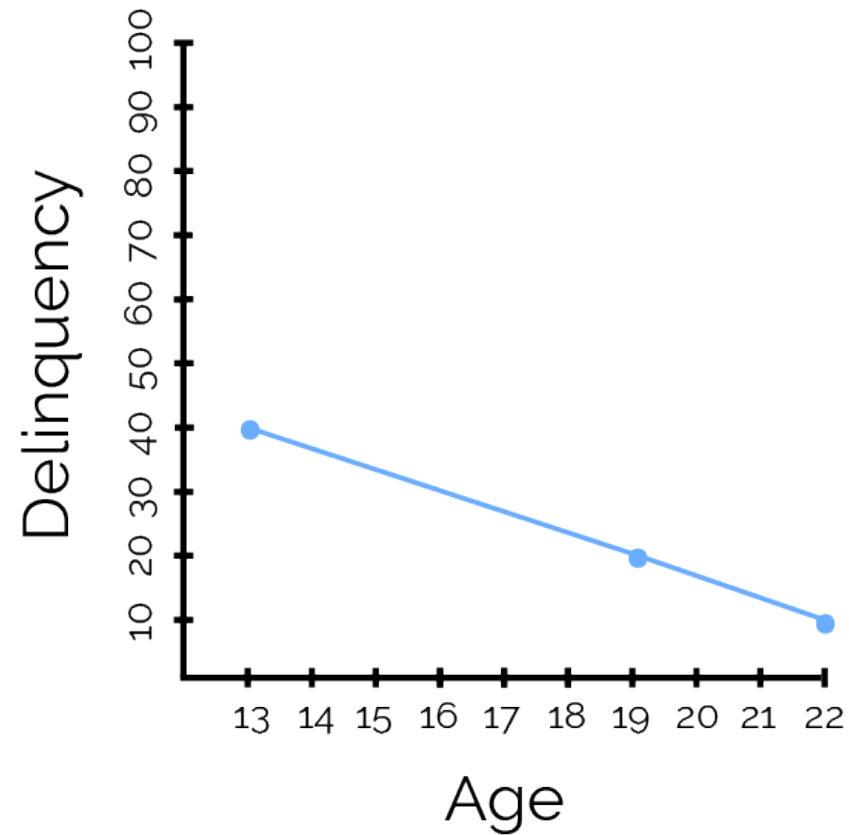
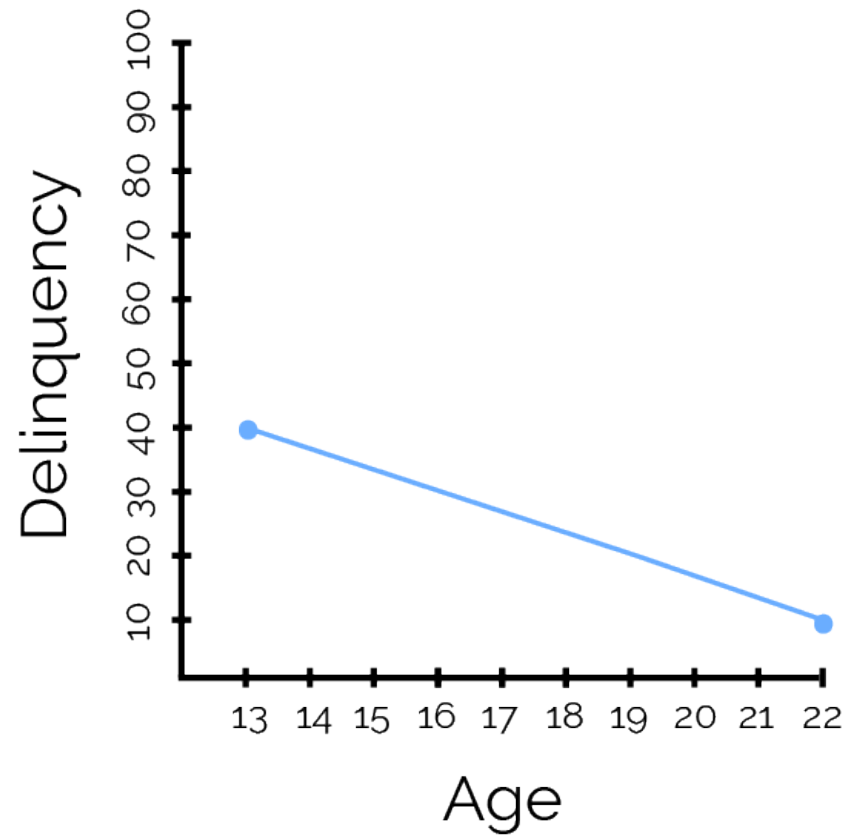
The incomplete picture of Juan



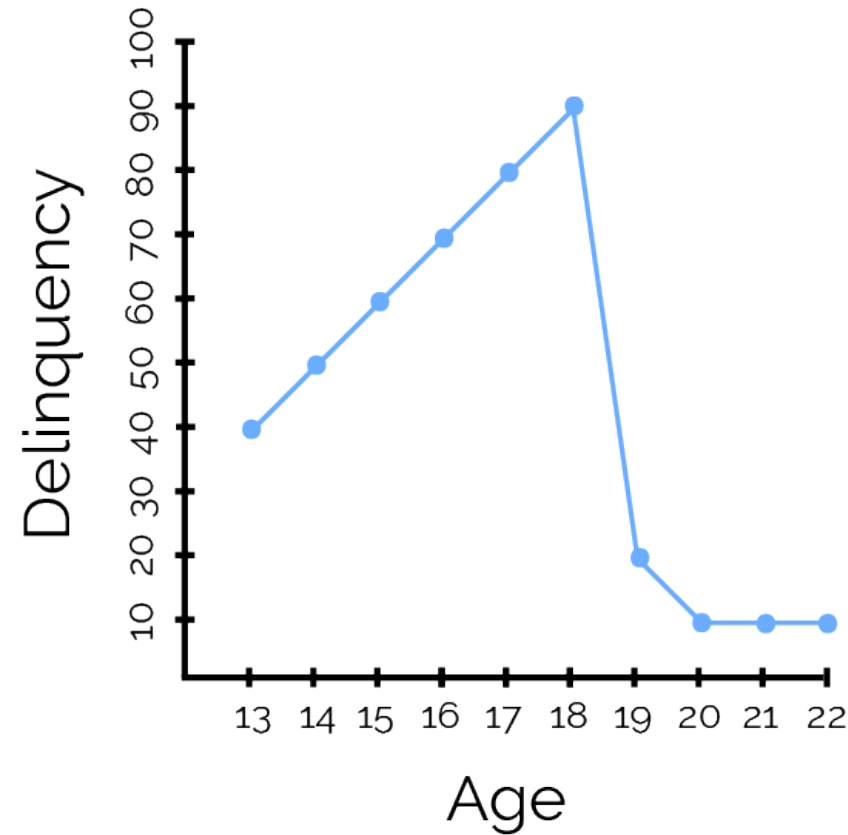
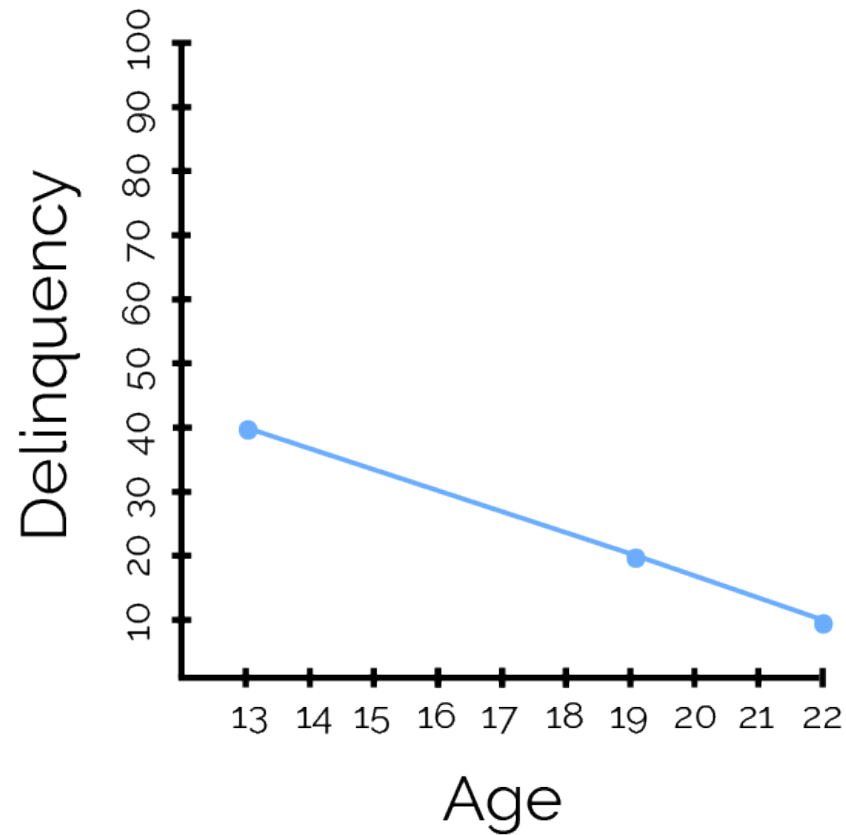
The incomplete picture of Juan



The incomplete picture of Juan

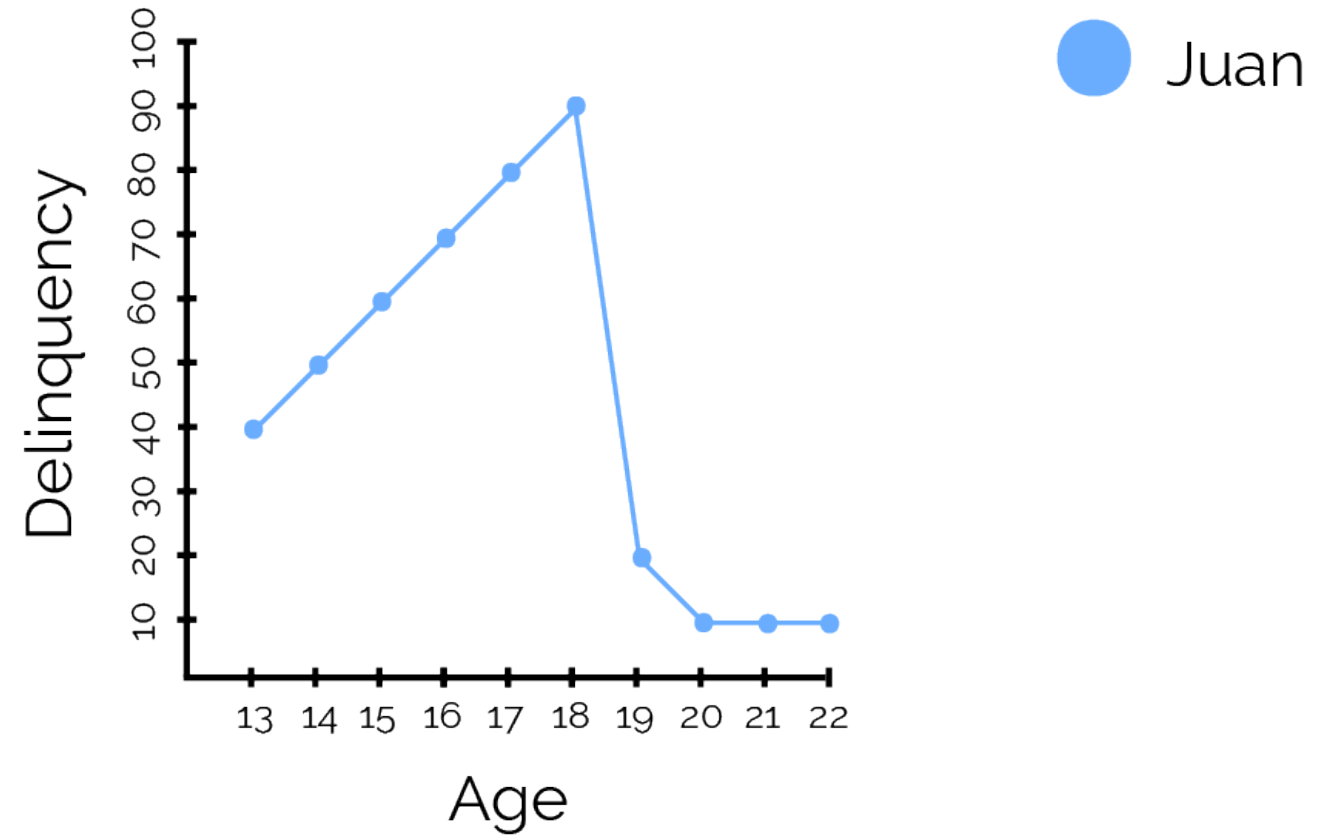


The incomplete picture of Juan

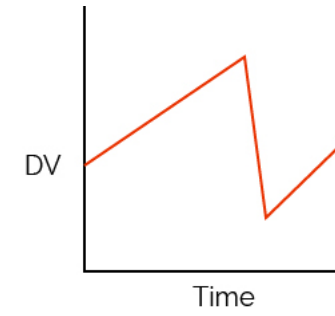
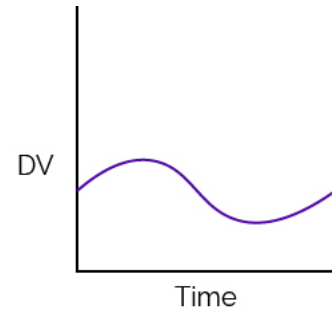
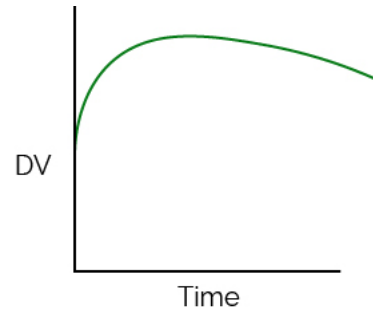
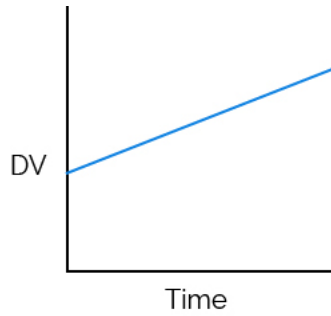


● Juan

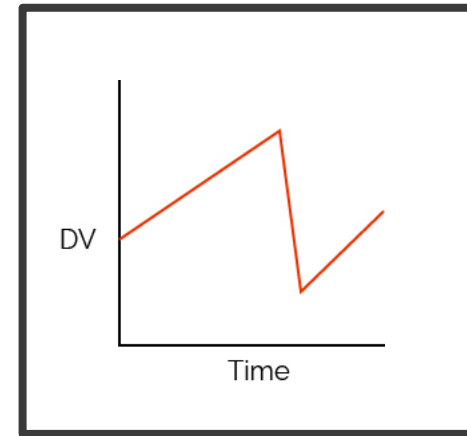
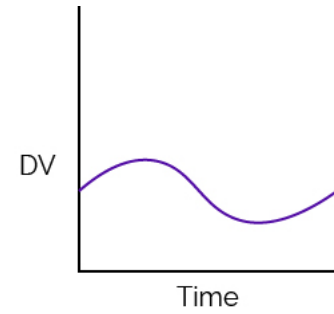
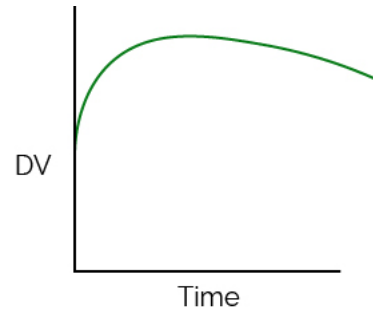
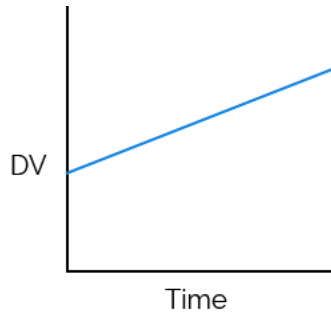
The incomplete picture of Juan



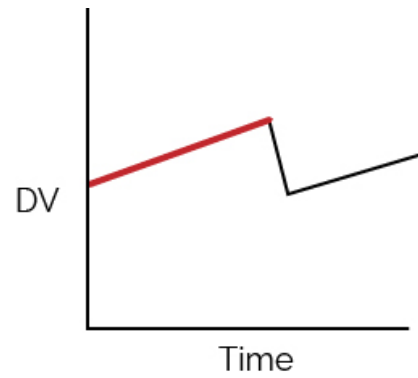
Discontinuity



Discontinuity

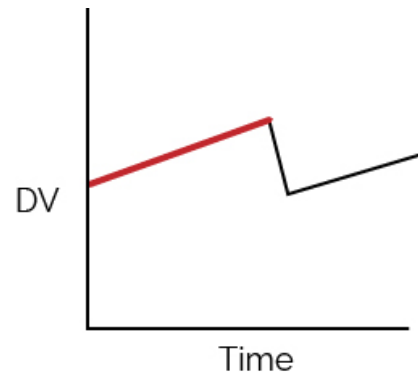


Components

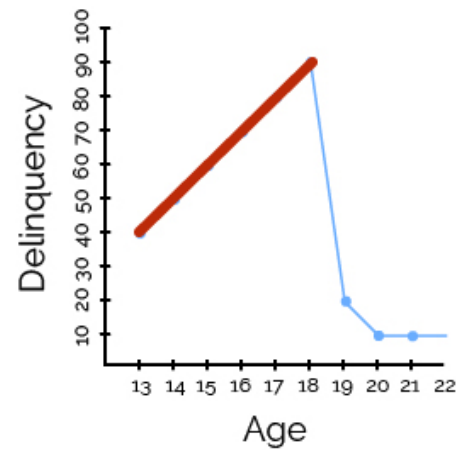


Pre-Transition

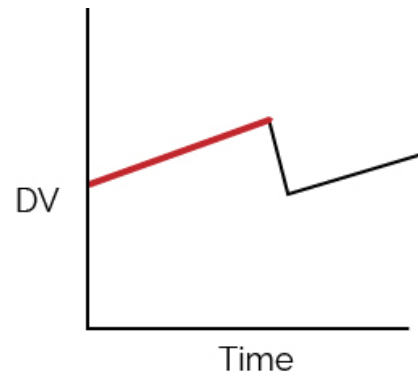
Components



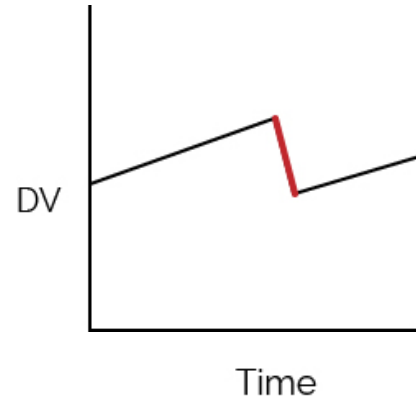
Pre-Transition



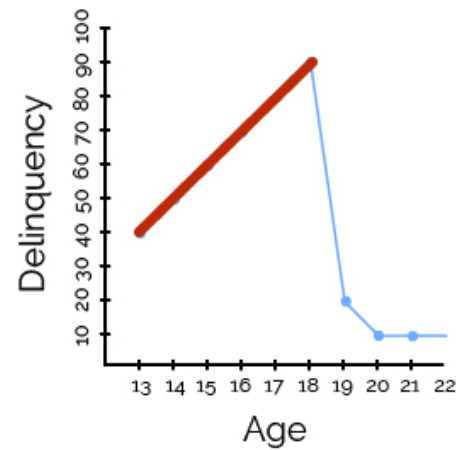
Components



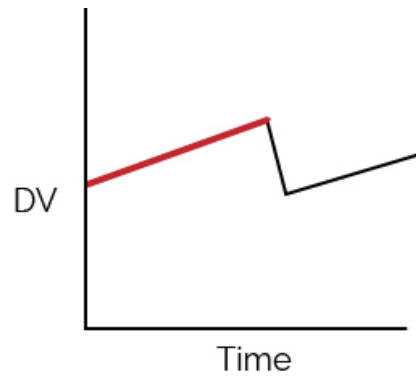
Pre-Transition



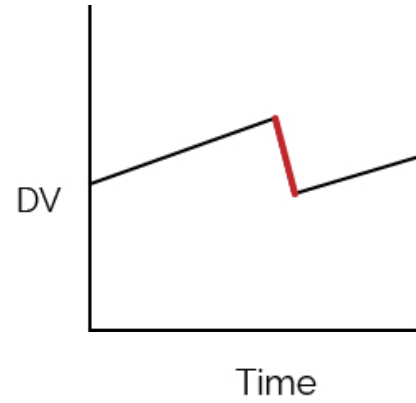
Transition



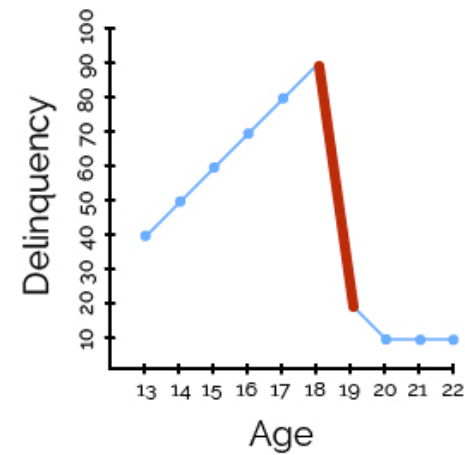
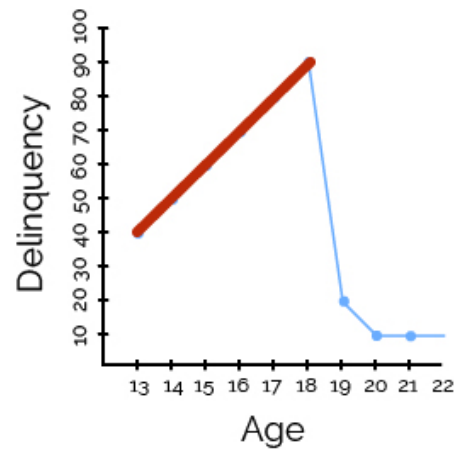
Components



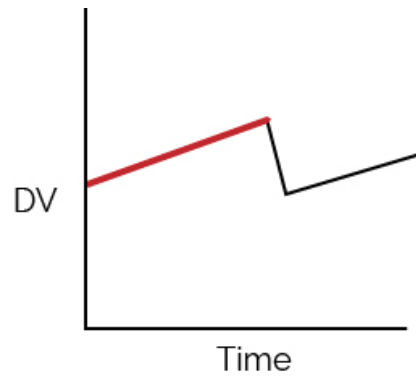
Pre-Transition



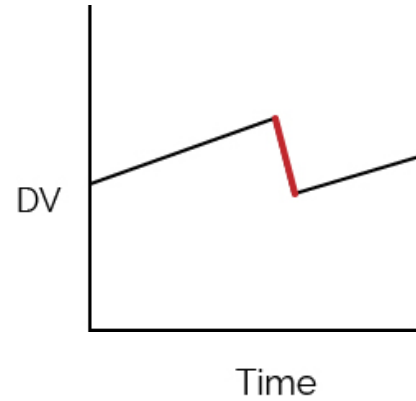
Transition



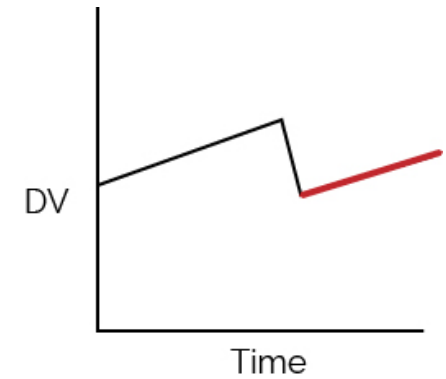
Components



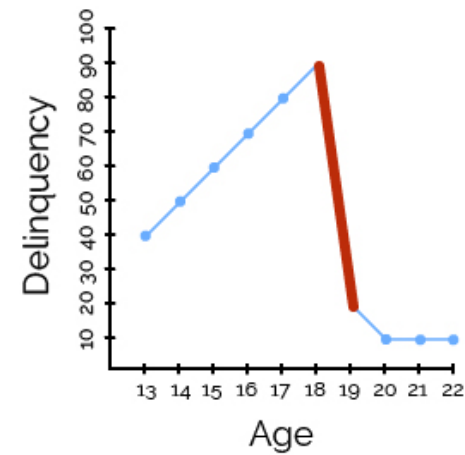
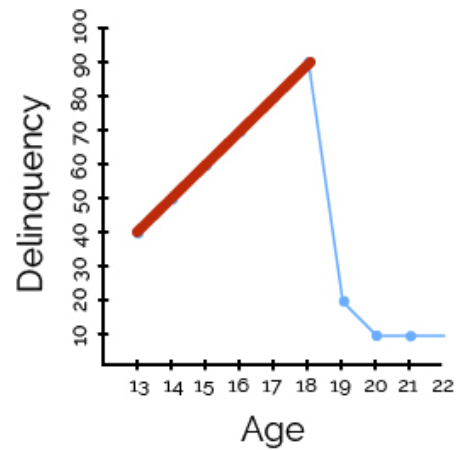
Pre-Transition



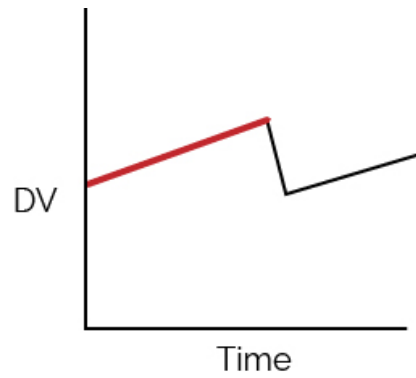
Transition



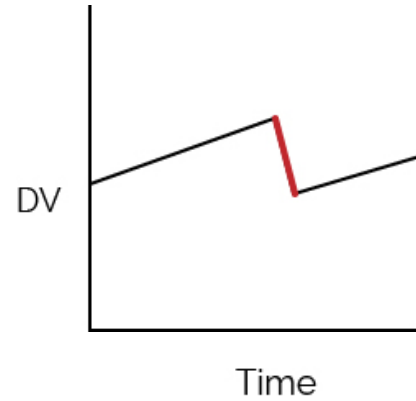
Recovery



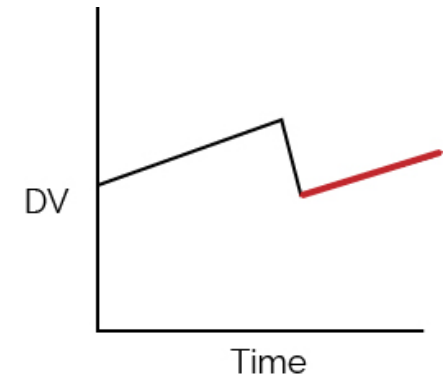
Components



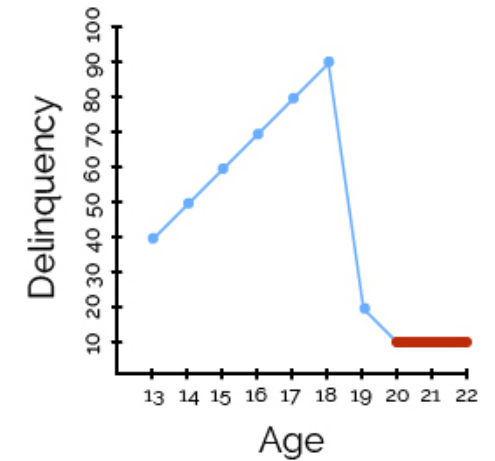
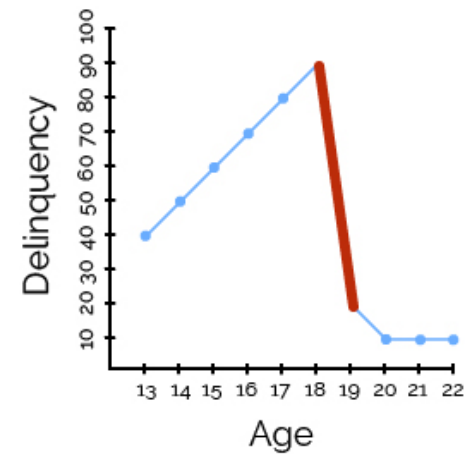
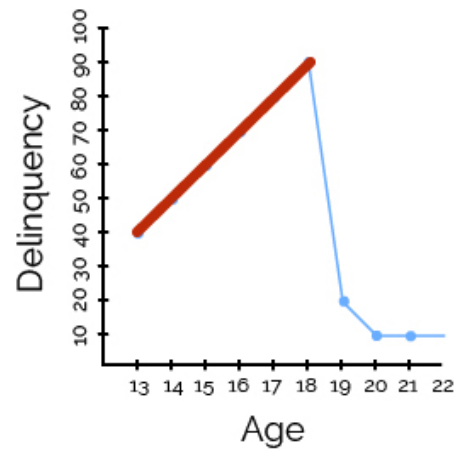
Pre-Transition



Transition



Recovery



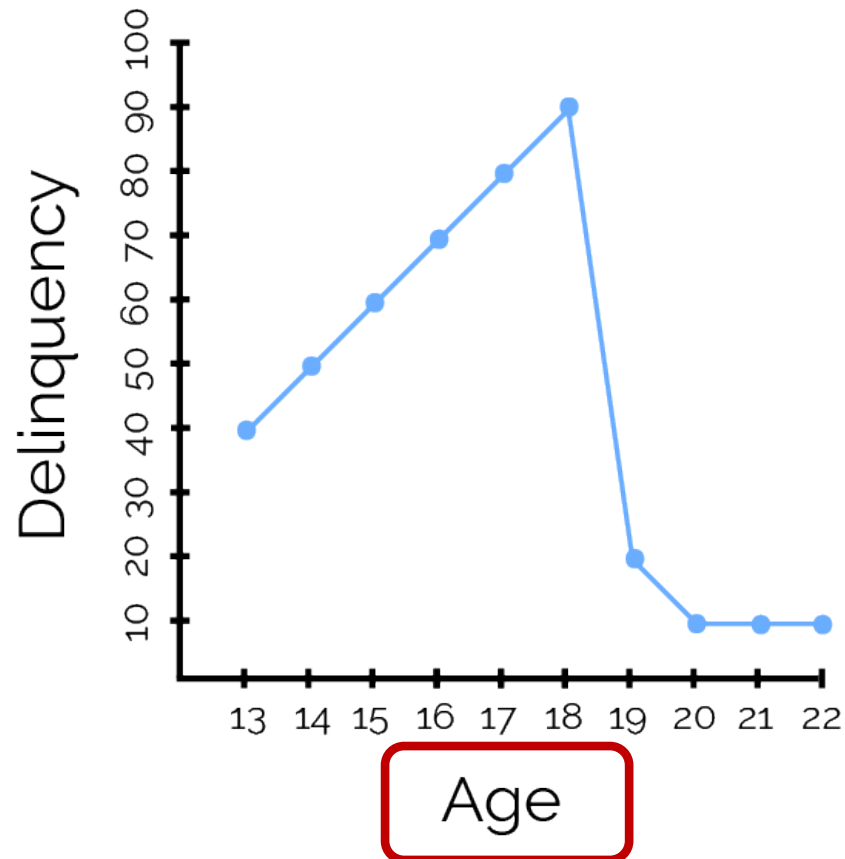
Data and analyses

Data management

Brief note on analyses

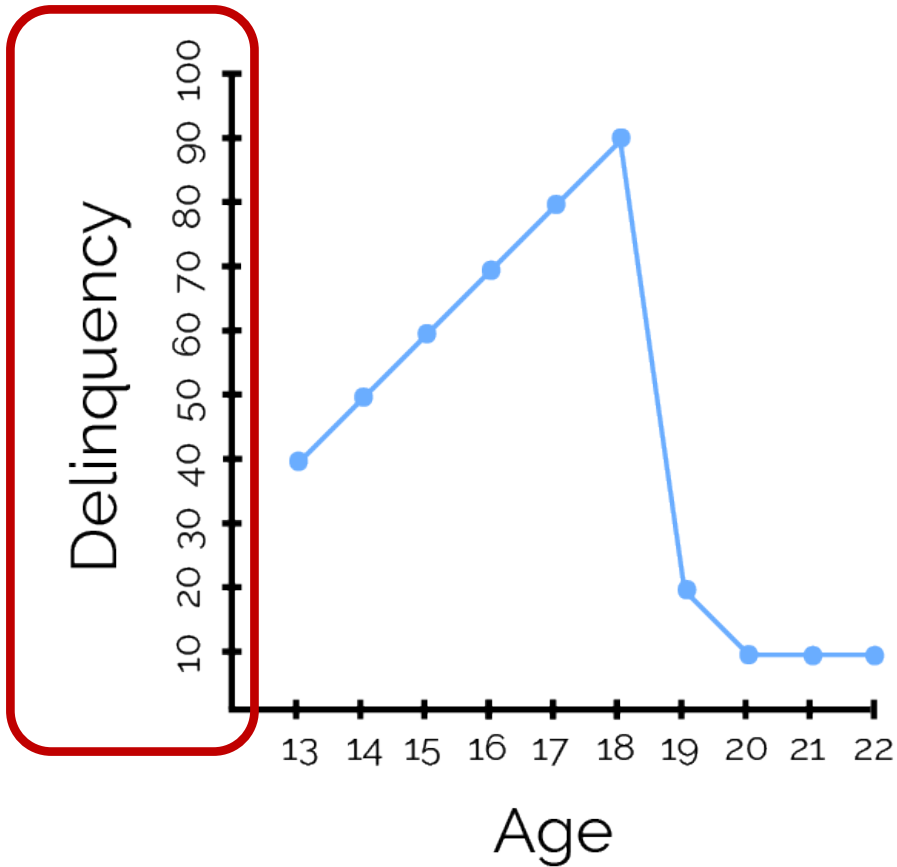
**Research question and interpretation
examples**

Data Management



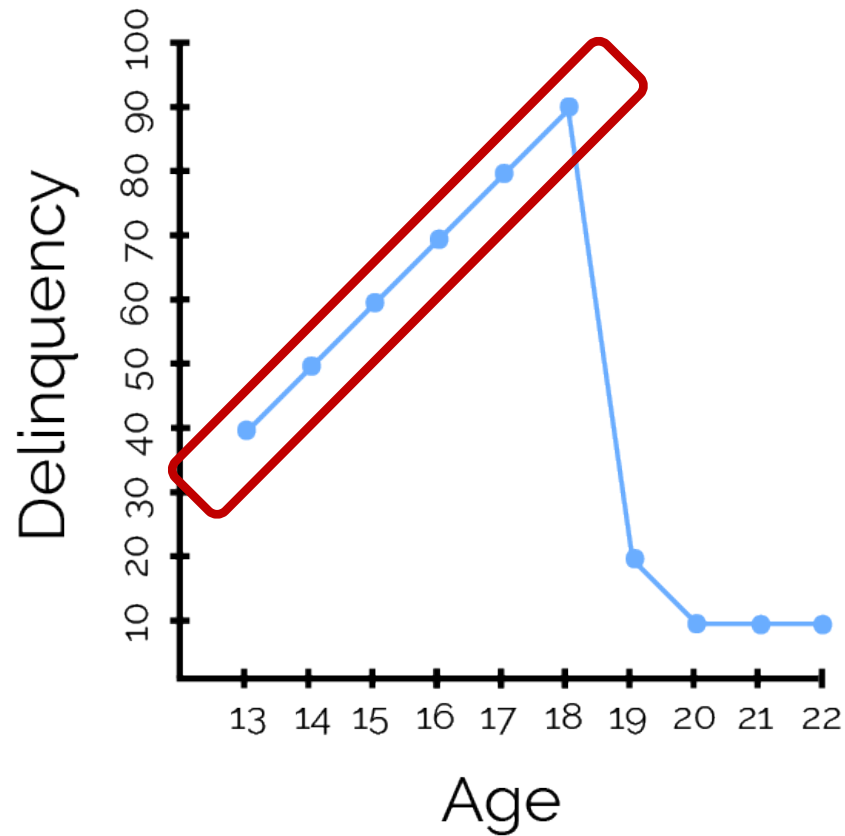
Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Data Management



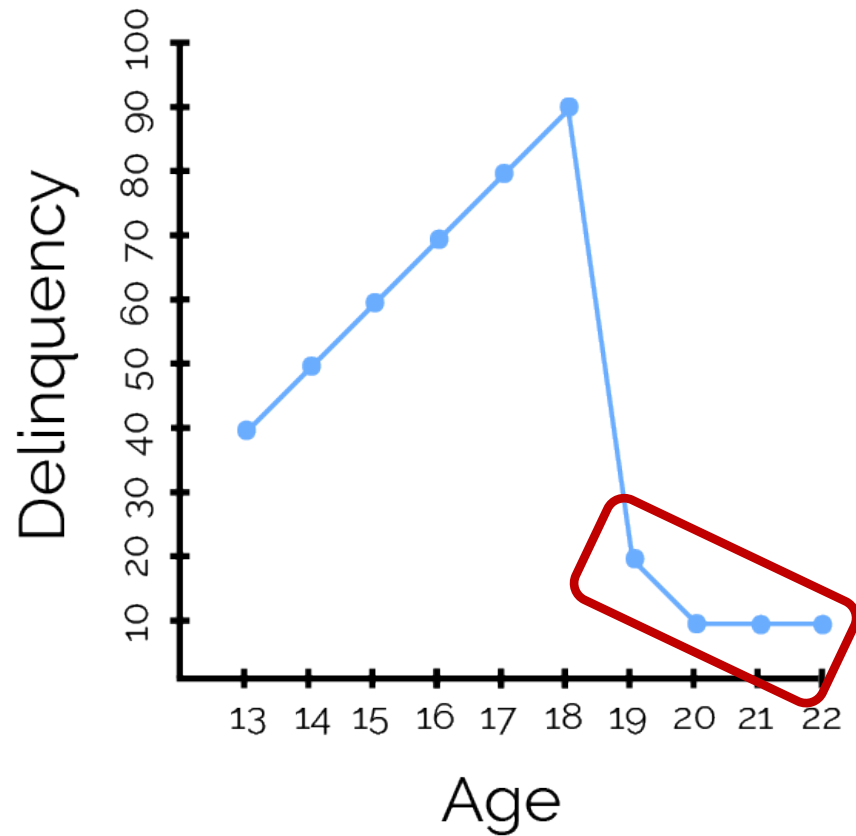
Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Data Management



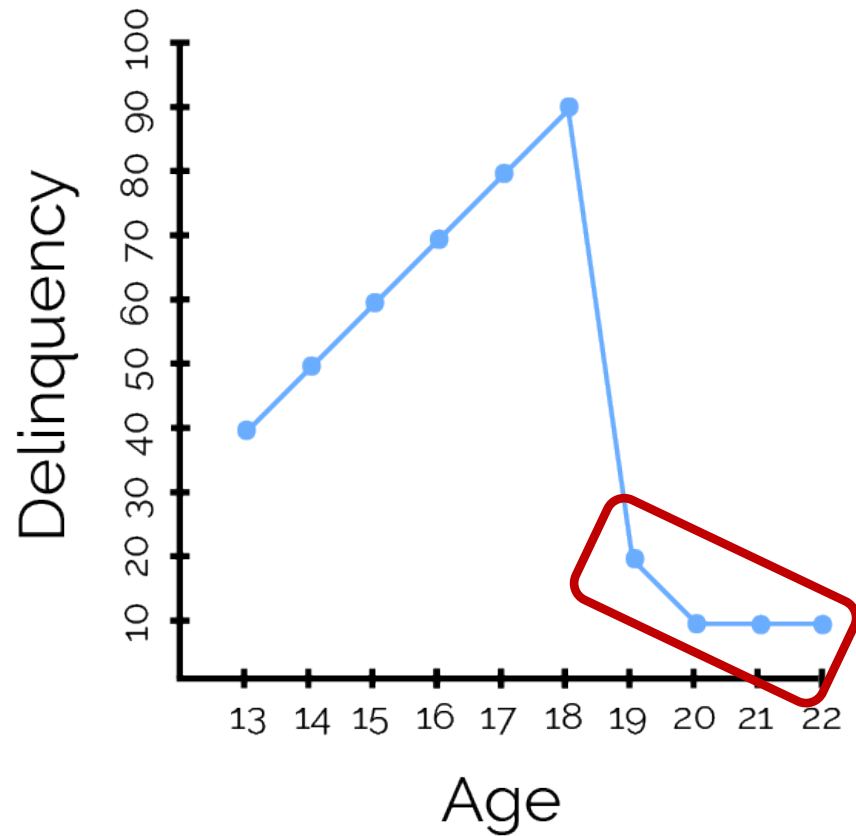
Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Data Management



Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Data Management



Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Analyses Steps

Bliese & Ployhart (2002)

Build Level-1 Model

Step 1: Estimate the ICC

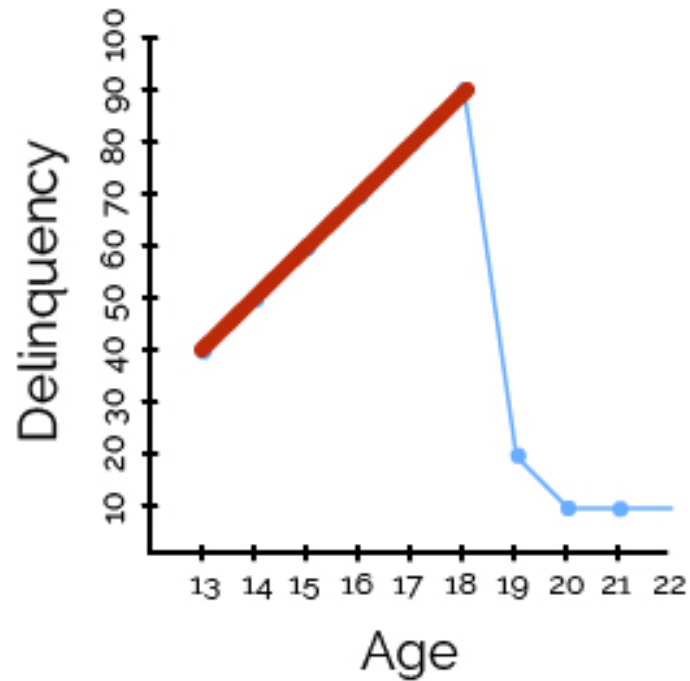
- Step 2: Examine Fixed Effects for:
 - TIME
 - TRANS
 - RECOV
- Step 3: Examine Variability in Growth Parameters
- Step 4: Model autocorrelation
- Step 5: Contrast Alternative Models

Build Level-2 Model (step 6)

- Add level-2 predictors (Level-2)

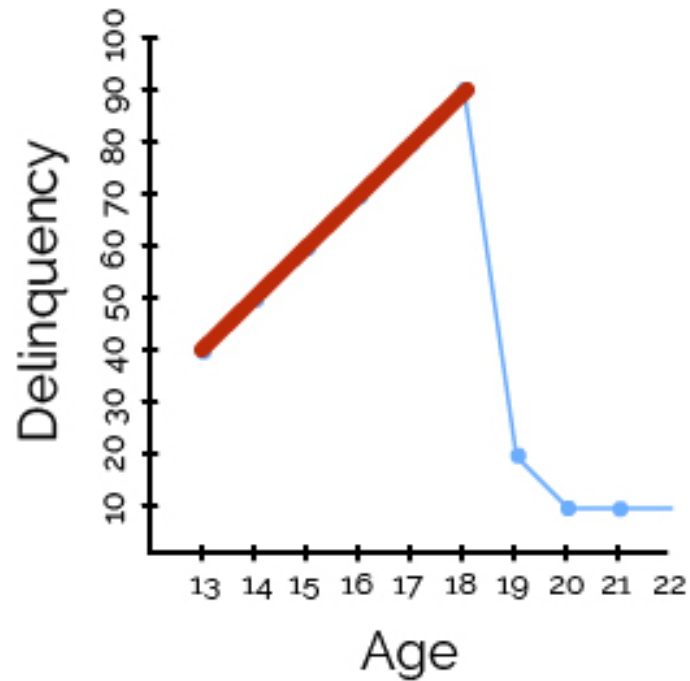
Example:

What is the slope and intercept of the pre-transition phase?
(Juan's delinquency before transition)



Example:

What is the slope and intercept of the pre-transition phase?
(Juan's delinquency before transition)

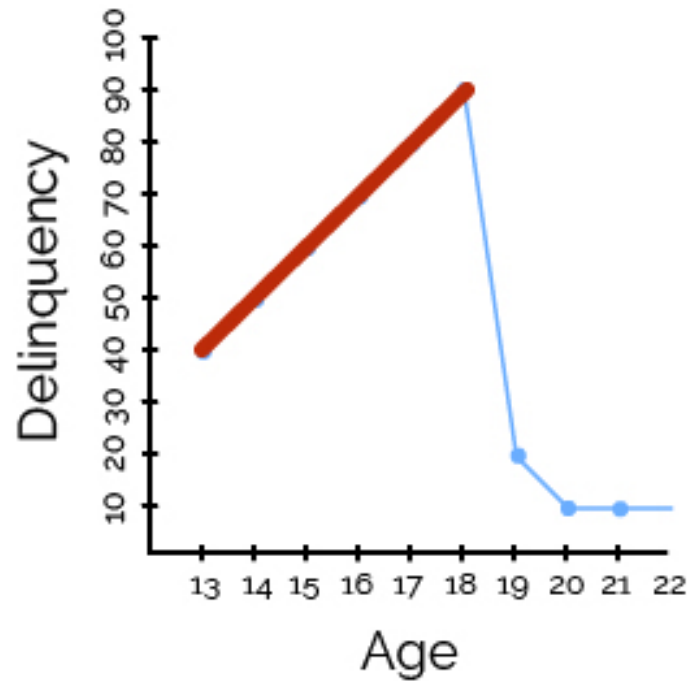


Data

Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Example:

What is the slope and intercept of the pre-transition phase?
(Juan's delinquency before transition)



Data

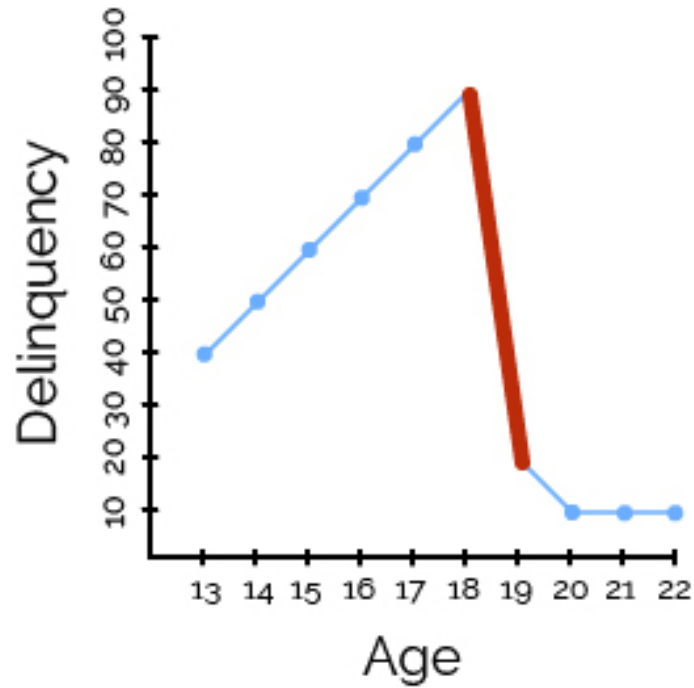
Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Parameters

	Estimate
(Intercept)	40
TIME	10
TRANS	XXX
RECOV	XXX

Example:

How will the transition (intervention) affect Juan's delinquency scores?

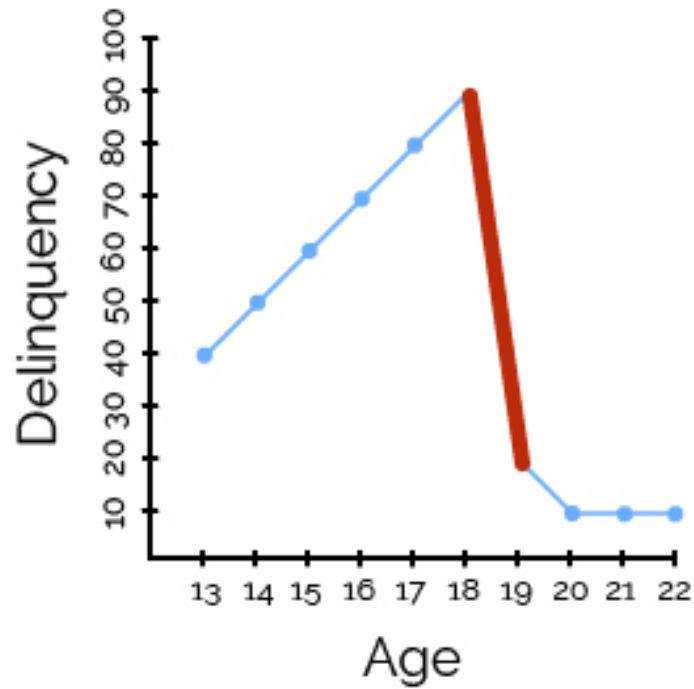


Data

Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Example:

How will the transition (intervention) affect Juan's delinquency scores?



Data

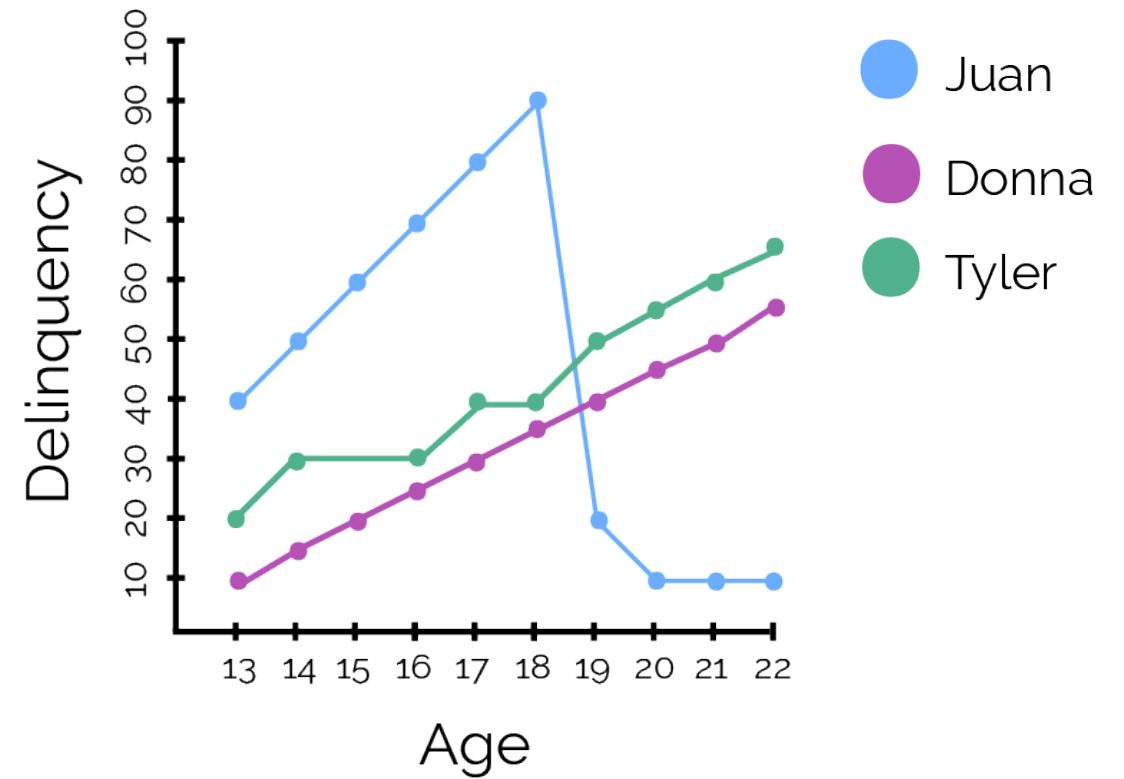
Age	TIME	TRANS	RECOV	SCORE (Delinquency)
13	0	0	0	40
14	1	0	0	50
15	2	0	0	60
16	3	0	0	70
17	4	0	0	80
18	5	0	0	90
19	6	1	0	20
20	7	1	1	10
21	8	1	2	10
22	9	1	3	10

Parameters

	Estimate
(Intercept)	40
TIME	10
TRANS	-80
RECOV	XXX

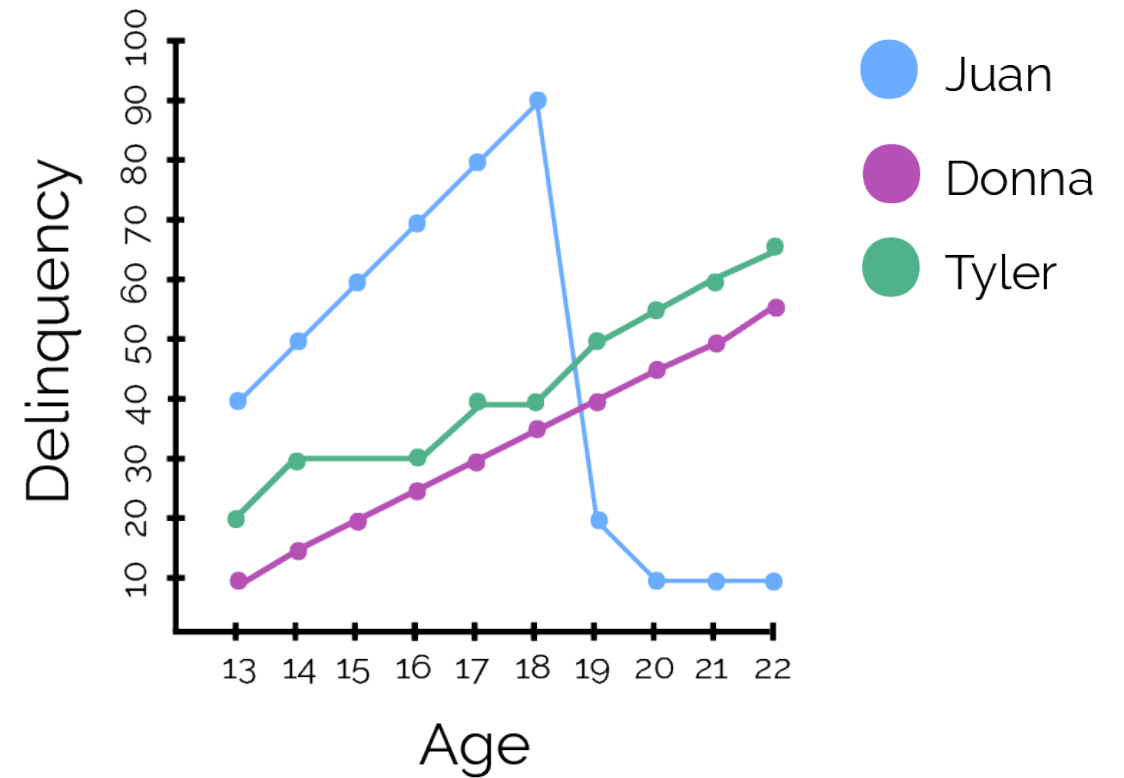
Future Directions

- Flexibility



Future Directions

- Flexibility
- Calls in literature



The first block of Table 4 presents parameter estimates from standard coding. In this model, the estimate of the intercept (0.996) represents the value of the dependent variable in the referent group (pre-transition) at TIME 0 (the occasion)

The second block of Table 4 reflects parameter estimates when TIME is held at 9 at the transition point in the coding we refer to as TIME.A.

Finally, the third block represents coding where the TIME vector continues the sequence through the first transition point (TIME.R).

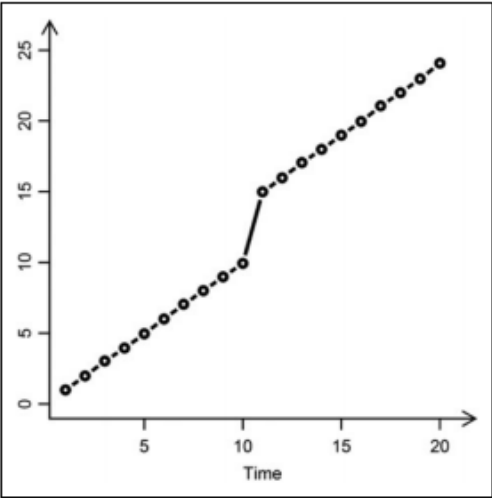


Figure 1. Structure of data with one discontinuity and equal slopes.

Table 4. Parameter Estimates From Basic Discontinuous Model.

	Estimate
(Intercept)	0.996
TIME	0.998
TRANS	4.008
RECOV	0.006
(Intercept)	0.996
TIME.A	0.998
TRANS	5.007
RECOV	1.004
(Intercept)	0.996
TIME.R	0.998
TRANS	4.008
RECOV	1.004

Questions

Example Resources on Github

Activity

- Complete Exercises (Advanced).doc

Data

- Discontinuous Growth State gdp 1997 to 2011.xlsx
- Discontinuous Growth Sleep Actigraph 26 day

References

Bliese P. D. 2000. Within-group agreement, non-interdependence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations—Foundations, extensions, and new directions*: 349–381. San Francisco, CA: Jossey-Bass.

Bliese P. D., Ployhart R. E. 2002. Growth modeling using random coefficient models: Model building, testing, and illustrations. *Organizational Research Methods*, 5: 362–387.

Bliese PD, Wesensten NJ, Balkin TJ. Age and inter-individual variability in performance during sleep restriction. *J Sleep Res* 2006;15:376–385.

Bliese, P. D., & Lang, J. W. (2016). Understanding relative and absolute change in discontinuous growth models: coding alternatives and implications for