
Study on Team Composition: Research Proposal

April 21, 2017

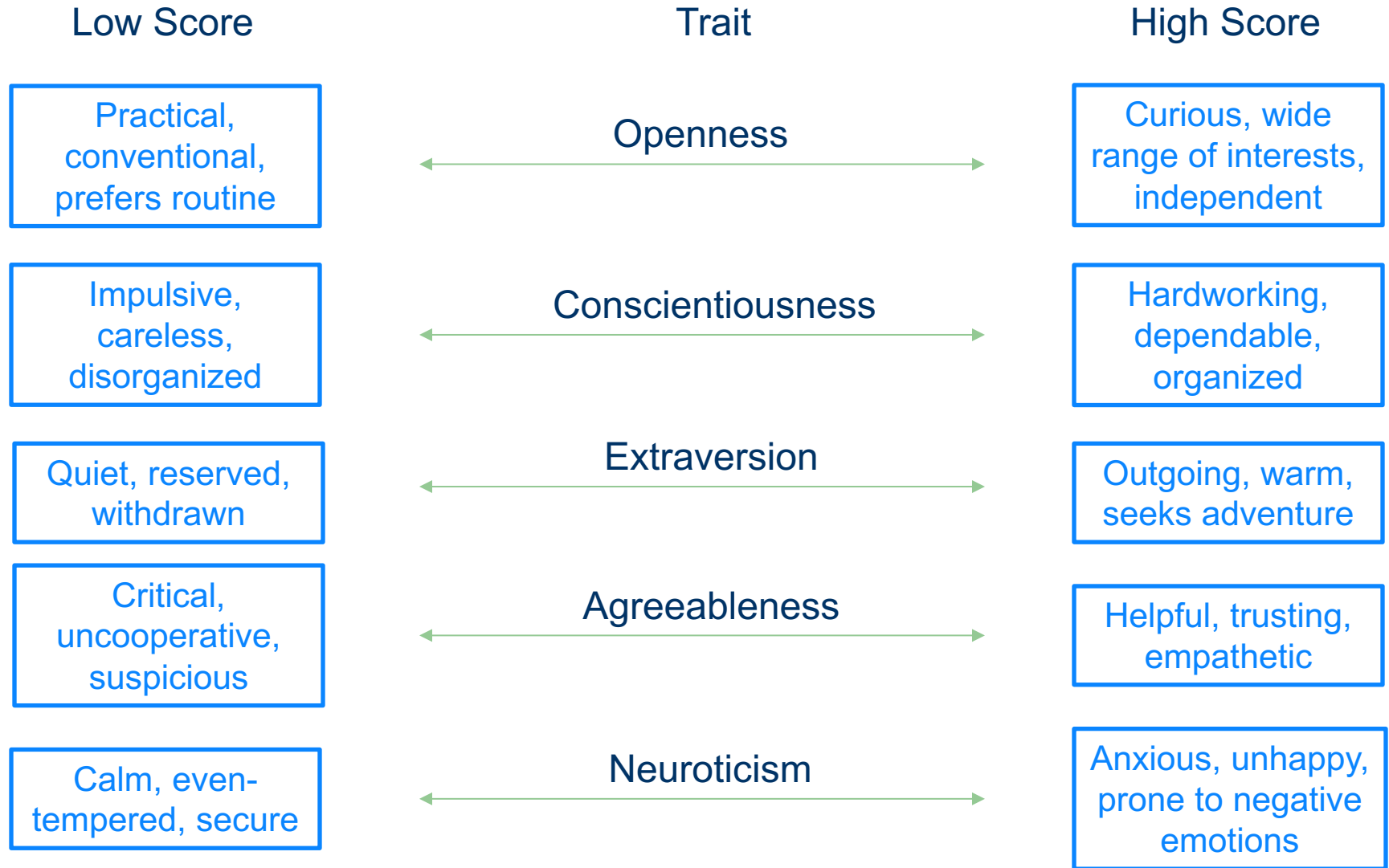
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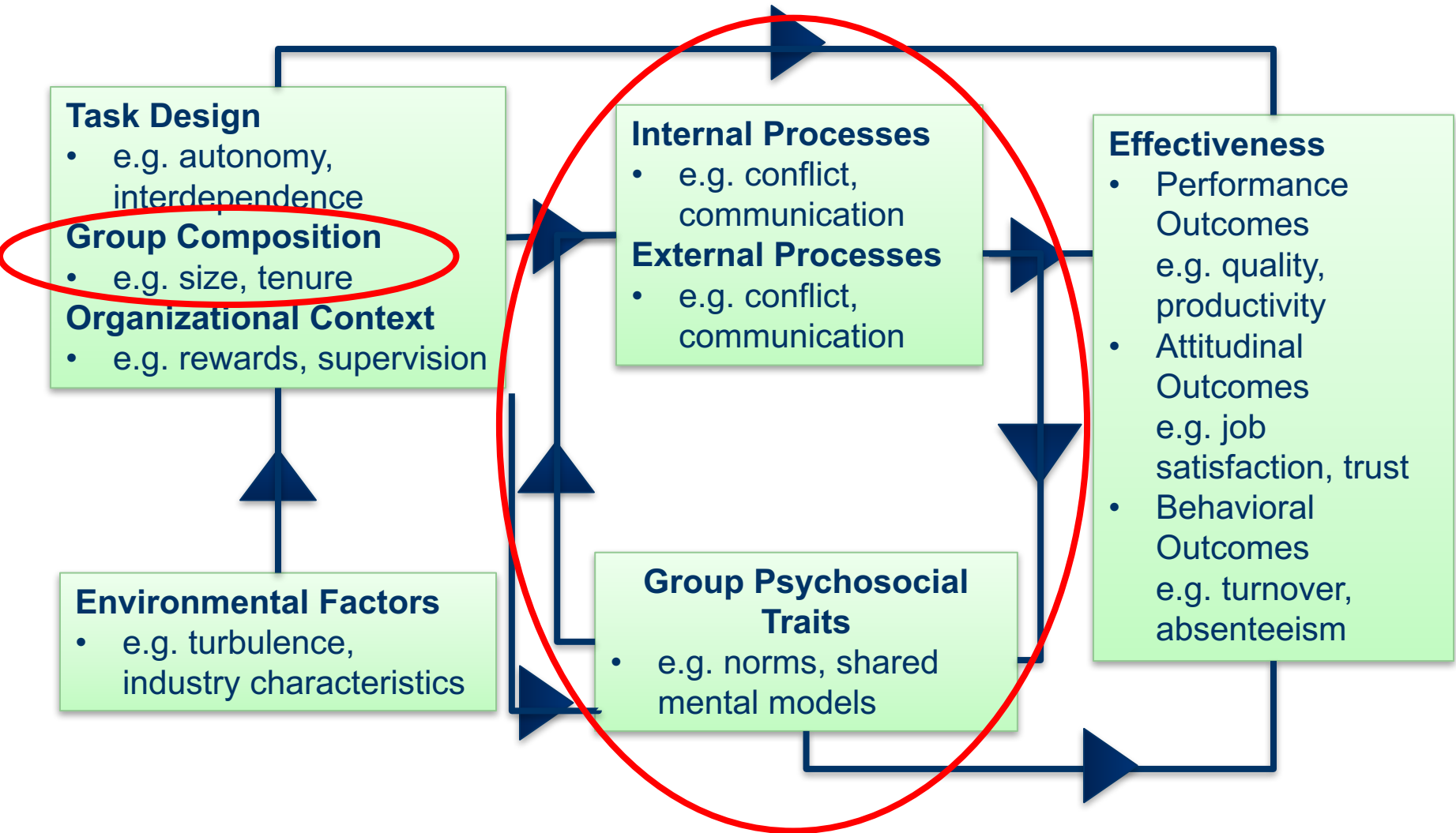
- *Motivation*
- *Background*
- *Five Factors*
- *Research Questions*
- *Theoretical Framework*
- *Sample*
- *Data Collection*
- *Timeline*
- *Data Analysis*
- *Limitations*
- *Reasoning*

- Teams are used in many aspects of life
 - In industry, teams are often used to create new processes, products, and to make improvements to existing infrastructure
 - At the college level, student teams are created to try and teach students how to be contributing members of teams
 - Student teams are often not meaningfully selected, leading to underperforming or incompatible teams
 - Senior level engineering student teams are similar to novice engineering teams, and can be used as a model for industry teams^[1]
- By better understanding teams, we can make improvements to team selection

- The Five-Factor Model has emerged as a prominent measure for personality^[2]
 - Model measures extraversion, agreeableness, conscientiousness, neuroticism, and openness
 - 50 Item International Personality Item Pool (IPIP) version of Big Five Markers survey
 - Each factor is measured on a scale of 0 to 50
- Limited research has been done using the Five Factor Model in team formation^[3]
- Females have higher levels of extraversion, openness, and conscientiousness^[4]
- Model has been tested for use of evaluating peer's personalities^[5]



1. Using the Five Factor Model, will student peer evaluations match self-evaluations?
2. Over time, will student peer evaluations change?
3. Over time, will student self evaluations change?
4. Convergence
 1. Will the individual converge to the peer ratings?
 2. Will the group ratings converge to the individual ratings?



[6] Cohen, S. G., & Bailey, D. E.

- Mechanical Engineering 4010 & 4020
 - Team design project oriented courses required for graduation
- ME4010
 - Teams of 6-7 students
 - Customer is local elementary or middle school
 - Project is focused on constructing an experiment for use in the classroom
- ME4020
 - Teams of 4-5 students
 - Customer is local company
 - Project comes from a real industry problem that needs to be solved

- 50 Item IPIP version of Big Five Markers
 - Replicated and administered using a google form
 - Demographic information will be collected at the same time
 - Which team
 - When 4010 was taken
 - Who the evaluation is for
 - If it's a peer evaluation, have you worked with them before?
 - If yes, social setting, class setting, project setting (curricular and extra-curricular)
 - Co-op (yes/no)
 - Gender
 - Ethnicity
 - Survey has been independently tested for reliability of a diverse group ages 16 and up^[5] but has not been on our specific engineering population specifically

- Summer 2017-Pilot
 - Testing for logistics
 - Run experiment in 4020 to look for changes*
 - Ask students to fill out FFM survey 3 times over the extent of the course
- Fall 2017
 - Run full experiment in 4010 and 4020
 - Students will take FFM 4-5 times during the semester (~every 3 weeks)
- December & January
 - Analyze results to look for changes in FFM between peer and self evaluations

*summer pilot study will be an exploratory study

Am the life of the party. *

	1	2	3	4	5	
Very Inaccurate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Accurate

- Measures: Extraversion
- Keyed: +
 - + keyed items: add the score (1-5)
 - - keyed items: add opposite of score on Likert scale (ex: answer of 1, add 5)
- Google form automatically calculates level of each factor

- Each question has a key
 - Five factor measured is represented by “E,” “A,” “C,” “N,” “O”
 - Scale key is either +1 or -1
- Positive and negative questions summed using sumifs statement
- Total score between 0 and 50 calculated using:

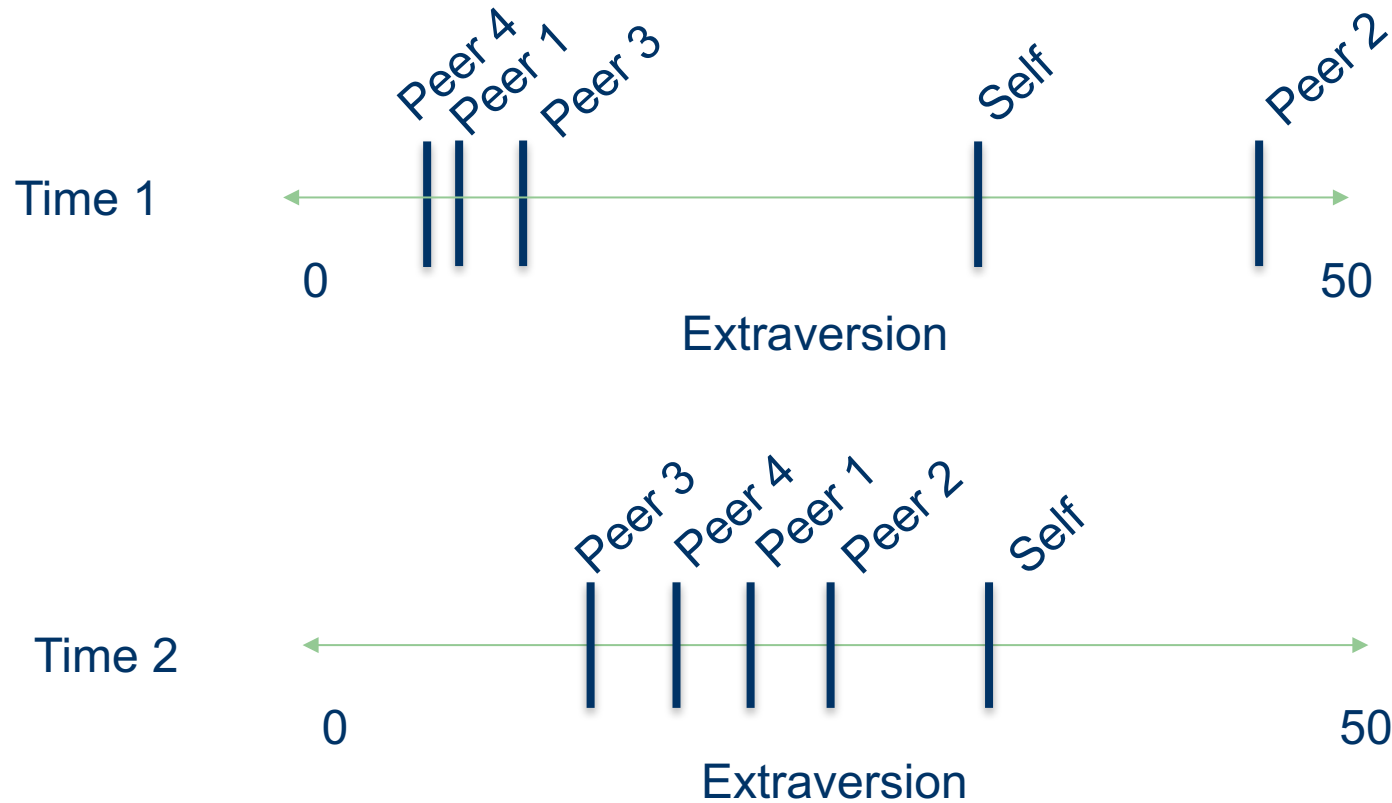
$$\begin{array}{l} \text{Sum of + keyed} \\ \text{questions} \end{array} + \begin{array}{l} \text{Number of} \\ \text{– keyed} \\ \text{questions} \end{array} \times 6 - \begin{array}{l} \text{Sum of} \\ \text{– keyed} \\ \text{questions} \end{array} = \begin{array}{l} \text{Total score} \\ \text{for factor} \end{array}$$

- Extraversion
 - 5 + keyed items
 - 5 – keyed items

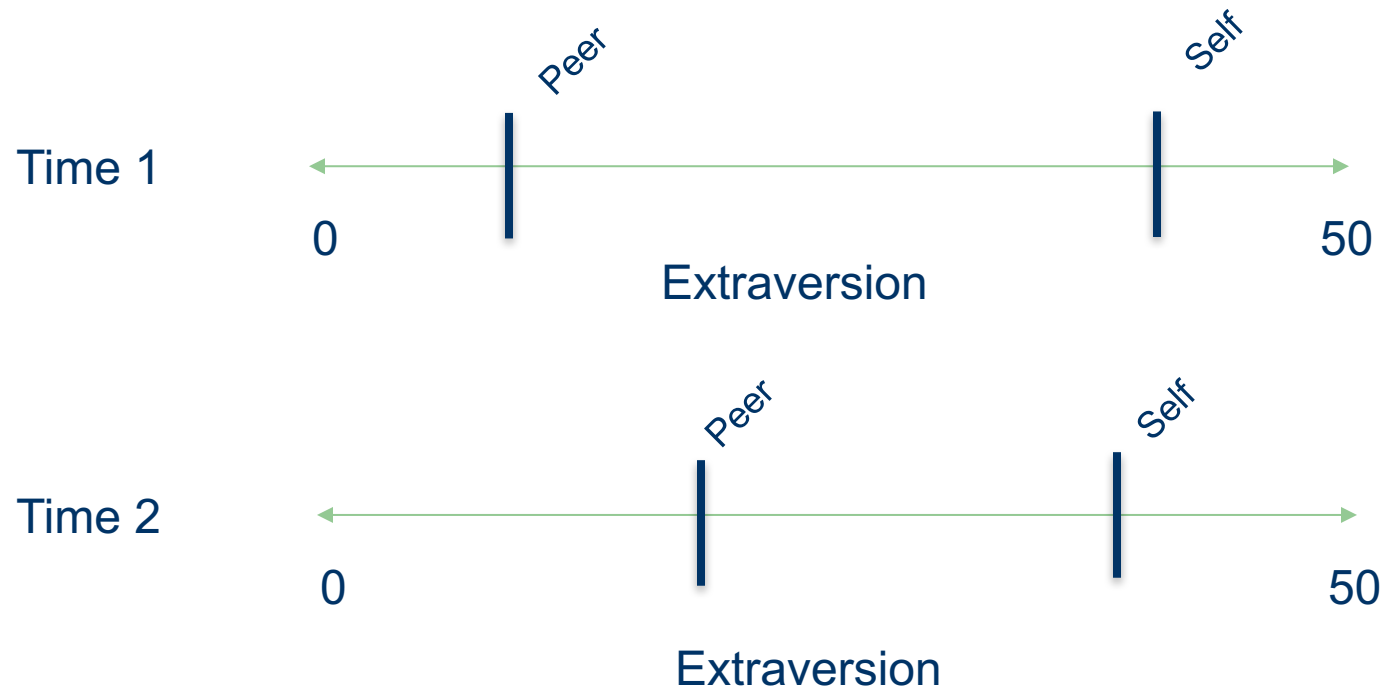
E	E	E	E	E	E	E	E	E	E
1	-1	1	-1	1	-1	1	-1	1	-1
2	3	4	4	1	3	1	4	3	2

- Sum of + keyed questions: 11
- Sum of - keyed questions: 16
- Total score for extraversion: 25
 $11 + 5 \times 6 - 16 = 25$

- Possible peer evaluation scenarios



- T-tests: to see if population means are different
 - Look for statistically significant changes between self-self evaluations and peer-self evaluations
 - Peer evaluations tested as a range or an average



- Non-Response Bias
- Number of teams and different team compositions
- Limited to mechanical engineering population at Clemson University and might not be applicable outside of specific population
- Limited by team selection
 - Have to take into account if students have worked together on a group project previously

- Why do we care about this?
 - To look at how teams evolve
 - Using evolution we can meaningfully select teams
 - By meaningfully selecting teams we can introduce new learning objectives about teamwork
 - Use in industry
 - Step towards looking at performance
- How is this related to engineering?
 - Engineers learning about engineers can lend to better recommendations about team performance

Questions?

- [1] Borrego, M., Karlin, J., McNair, L. D., Beddoes, K., 2013 “Team Effectiveness Theory from Industrial and Organizational Psychology Applied to Engineering Student Project Teams: A Research Review,” *Journal of Engineering Education*, **102** (4), pp. 472-512.
- [2] Goldberg, L. R., 1992, “The Development of Markers for the Big-Five Factor Structure,” *American Psychological Association*, **4**(1), pp.26-42.
- [3] Ogot, M., Okudan, G. E., 2006, “The Five-Factor Model personality assessment for improved student design team performance,” *European Journal of Engineering Education*, **31**(5), pp.517-529.
- [4] Weisberg, Y. J., DeYoung, C. G., Hirsh, J. B., 2011, “Gender differences in personality across the ten aspects of the Big Five,” *Frontiers in Psychology*, **2**, 178.
- [5] McCrae, R. R., Costa, P. T., 1987, “Validation of the Five-Factor Model of Personality Across Instruments and Observers,” *Journal of Personality and Social Psychology*, **52**(1), pp.81-90.
- [6] Cohen, S. G., Bailey, D. E., 1997, “What Makes Teams Work: Group Effectiveness Research from the Shop Floor to the Executive Suit,” *Journal of Management*, **23**(3), pp. 239-290.