

## NATURE AND NURTURE: THE IMPACT OF AUTOMATICITY AND THE STRUCTURATION OF COMMUNICATION ON VIRTUAL TEAM BEHAVIOR AND PERFORMANCE

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### Appendix

#### Perceived Time Pressure Measure

(Cronbach's Alpha = 0.91)

Concerning discussions for each round, did you:

Have as Much Time as You Needed				Neutral/ Undecided				Want More Time
1	2	3	4	5	6	7		

Did you have enough time to review other comments and suggestions?

Have as Much Time as You Needed				Neutral/ Undecided				Want More Time
1	2	3	4	5	6	7		

Did you feel rushed when making comments?

Have as Much Time as You Needed				Neutral/ Undecided				Want More Time
1	2	3	4	5	6	7		

Considering all the comments you made, did you:

Have as Much Time as You Needed				Neutral/ Undecided				Want More Time
1	2	3	4	5	6	7		

**Perceived Effectiveness Measure**

(Items were reverse coded for analysis, so that higher values meant higher perceived effectiveness; Cronbach's Alpha = 0.91)

How effective was your group at making decisions?

Very Effective			Neutral/ Undecided			Not at All Effective
1	2	3	4	5	6	7

How effective was your group at evaluating decisions?

Very Effective			Neutral/ Undecided			Not at All Effective
1	2	3	4	5	6	7

**Enjoyment Measure**

(Items were reverse coded for analysis, so that higher values meant higher enjoyment; Cronbach's Alpha = 0.92)

How much fun was this discussion?

Very Enjoyable			Neutral/ Undecided			Not at All Enjoyable
1	2	3	4	5	6	7

Overall, how enjoyable did you find your experience in this group?

Very Enjoyable			Neutral/ Undecided			Not at All Enjoyable
1	2	3	4	5	6	7

To what extent did you enjoy participating in this discussion?

Very Enjoyable			Neutral/ Undecided			Not at All Enjoyable
1	2	3	4	5	6	7

**Social Communication Behaviors during Tool Use Measure**

(Cronbach's Alpha = 0.92)

Please consider a situation where you are using [IM, DF] to discuss a homework assignment with three or four of your friends who are taking the same course. How likely would you do the following (1 = Not at all likely; 4 = Neutral; 7 = Very likely):

- Make a humorous comment
- Tell a joke
- Mention a current event (e.g., news, politics, sports)
- Mention an event on campus (e.g., basketball, movies)
- Mention your social plans for the weekend
- Invite someone to party
- Mention how you feel (e.g., tired, hungry)
- Ask someone else how they feel
- Mention work in another class
- Have a side conversation
- Discuss something not directly related to the homework assignment
- If two members of the group started talking about something not related to the homework assignment, reply to their comments

## Non-Task Comments Coding Rules

Comments about the game play are to be coded as on-task, including

- Comments about where to move during each other's turn including speculation on where the campers might be
- Comments on individual findings after each round, including definite, possible evidence, or no evidence, that each participant received from the facilitator and were asked to share with one another
- Encouraging comments to one another specifically related to the game play (e.g., "Good job, team! We found 2 missing campers so far.")
- Comments about participants' role that were related to the game play (e.g., "Ranger – why don't u and ur search dogs go a bit closer to the water?")

Comments that are not relevant to the game play are considered to be off-task, including

- Comments about participants' role or the game play that had nothing to do with the task and appeared to be intended as humor (i.e., "Sasquatch may be better at finding these kids than us. What color do you think Sasquatch is?")
- Comments about where participants were going after the experiment
- Comments about current events outside of the experiment (e.g., sports teams, politics)
- Comments about the experiment itself (e.g., "Do we have to do a survey after the missing camper task is done?")

If one comment contains multiple thoughts, some of which are on-task and some off-task, it should be coded as on-task, unless it triggered subsequent related comments that were off-task.

## Finding a Tipping Point

There is no continuous relationship between the proportion of non-task-focused comments and decision quality. Instead, it is a discontinuous relationship that has two separate and distinct means. Below a certain tipping point, the team discussion is task focused and results in task performance that is distributed around some mean decision quality. Above the tipping point, a contagion effect occurs and the non-task-focused discussion drives out the ability to reach good quality decisions; the discussion is not adequately task-focused and performance is distributed around a different, much lower mean decision quality. In both cases, the distribution around the mean decision quality is not related to the proportion of non-task-related comments by any specific function.

Thus, to find this tipping point beyond which contagion ensues, we should not examine the relationship between non-task-focused comments and decision quality, because there is no functional relationship. Instead, we examined the proportion of non-task-focused comments to see if we could identify a point at which it grew faster than would otherwise be expected. We began by converting the proportion of non-task-focused comments into a 0 to 1 scaled variable; we divided the number of non-task-focused comments by its maximum (41%) to produce a non-task-focused comments variable ranging from 0 to 1. We then sorted the teams based on the proportion of non-task-focused comments from lowest to highest and assigned all 39 data points an ordinal number from one to 39 representing their order from lowest to highest. We then mean-centered this ordinal data (i.e., subtracted 20) and then divided by the maximum (20) to give a uniform ordinal distribution from -1 to +1, centered on zero.

We used the SPSS regression curve estimation procedure to find the best fitting curve between the ordinal placement of the team and its proportion of non-task-focused comments. The best fit curve was a cubic function, with an  $R^2$  of .98 and all four terms significant (see Figure A1). The function is:  $f(x) = .089 + .231x + .420x^2 + .322x^3$ , where  $x$  is the mean-centered ordinal value on the -1 to +1 scale and  $f(x)$  is the non-task-focused comments variable on the 0 to 1 scale.

This function shows how the amount of non-task-focused comments increases over the sample. We see that below the median ( $x=0$ ), there is a slow, gradual increase in the amount of non-task-focused comments from one ordinal position to the next. After the median, non-task-focused comments begin to increase at an increasing rate.

What slope should we consider a potential tipping point? We believe that a key tipping point could be when the slope first exceeds 1 (i.e., a 45 degree tangent line). At this point, the amount of non-task-focused comments is increasing at a noticeably faster rate. The first derivative provides the slope at any given point. The first derivative is  $f'(x) = .231 + .840x + .966x^2$ . Solving for  $x$  when  $f'(x) = 1$ , gives  $x = .559$ , or the 31<sup>st</sup> ordinal data point (at which point the percent of non-task comments equals 16%). This partitions the data into two sets: (1) 30 teams below this point; and (2) 9 teams above this point. This has some face-value appeal as it divides the data into close to a 75-25 split.

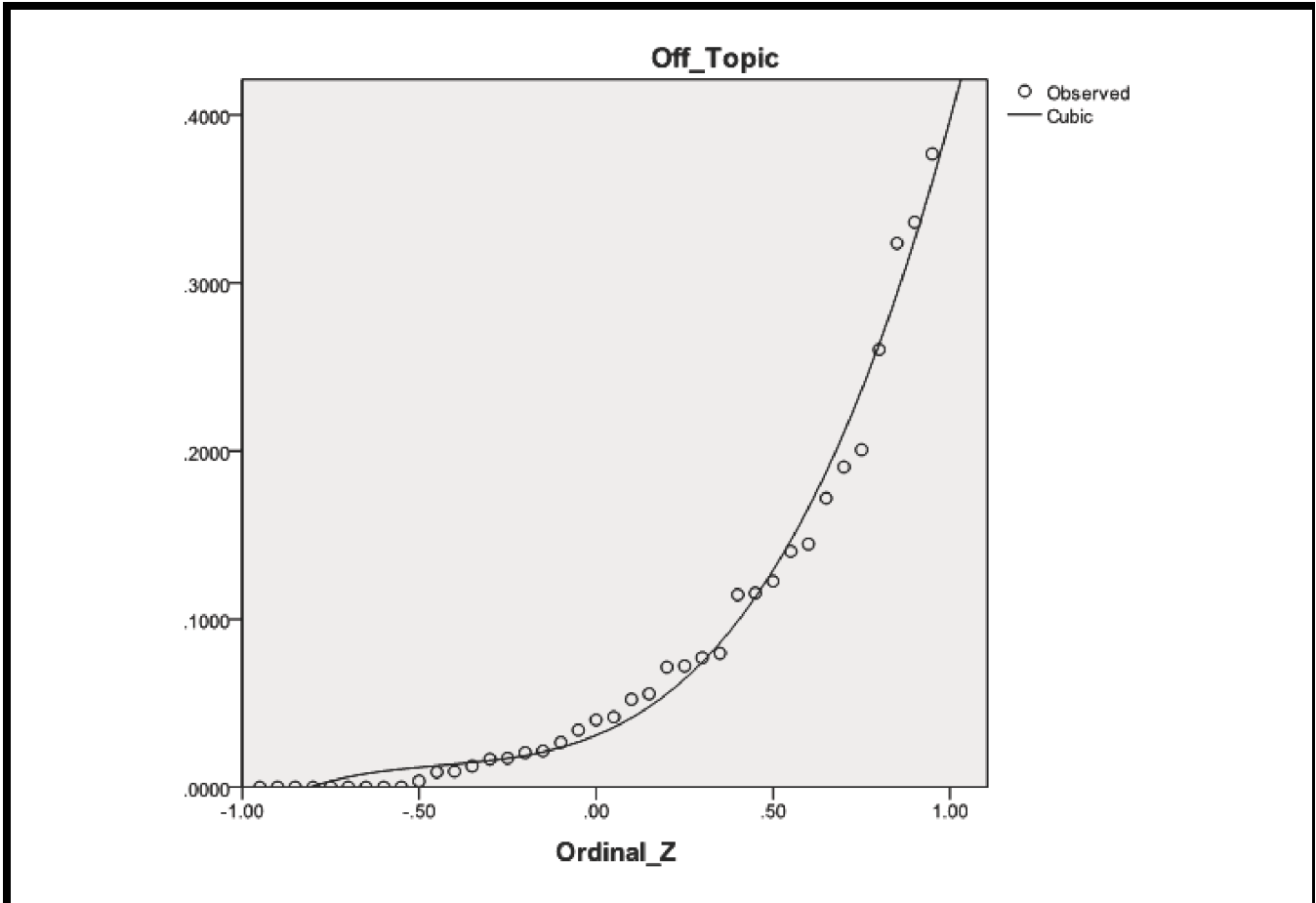


Figure A1. The Relationship between Ordinal Position and Relative Non-Task Comments