Combating Social Loafing Performance Reductions in Virtual Groups With Increased Cohesion, Reduced Deindividuation, and Heightened Evaluation Potential Through Self-Disclosure.

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Combating Social Loafing Performance Reductions in Virtual Groups with Increased Cohesion, Reduced Deindividuation, and Heightened Evaluation Potential Through Self-Disclosure.

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A Thesis in the Field of Psychology
for the Degree of Master of Liberal Arts in Extension Studies

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Abstract

Over 100 years of research have shown that social loafing is a real and material psychological phenomenon that reduces performance among humans in groups. It is known that increasing evaluation potential, decreasing deindividuation, and cohesion all lead to reduced social loafing in physical environments. What has not yet been well researched is whether or not the findings associated with many of these variables also apply to virtualized working environments.

In the present study, 200 individuals were recruited through Amazon Mechanical Turk (an online work community) and were split into experimental and control groups. While both sets of participants engaged in identical alphabetization tasks and were informed that they were the final member of a five-person team, only the experimental subjects were asked to read the short biographies of their teammates and write a short biography of themselves for their teammates to read. By having experimental participants engage in self-disclosure it was expected they would experience reduced deindividuation (which is common with virtual teams), increased perceived evaluation potential, and increased feelings of cohesion.

Differences in quantity and quality of performance, and differences in morale (although not cohesion itself), were all in the expected direction, though none achieved levels of statistical significance driven largely by material performance variances within the datasets. Experimental subjects produced, on average, 1.9% additional correct alphabetization groupings (averaging 16.64 of 50 among experimental participants and
16.33 of 50 among control participants) compared to control subjects who were only aware they were a member of a team \((F(1, 164) = .04, p > .05)\). Furthermore, in addition to attempting to alphabetize more groups, the experimental subjects’ answers were, on average, 0.38% more likely to be alphabetized correctly \((F(1, 164) = .03, p > .05)\).

The Perceived Cohesion Scale (PCS) (Bollen & Hoyle, 1990) was included in 160 of the participants’ tasks and experimental subjects scored 2.3% higher \((F(1, 122) = .209, p > .05)\) in feelings of “being enthusiastic about working online”, 3.0% higher \((F(1, 122) = .49, p > .05)\) on being “happy to be working on Amazon Mechanical Turk”, 1.4% higher \((F(1, 122) = .04, p > .05)\) on believing that Amazon Mechanical Turk was “one of the best working communities in the world”, and 2.3% higher \((F(1, 122) = .22, p > .05)\) on the entire category of “Feelings of Morale”.

As an example of the level of variance within the data, the standard deviation (SD) for number of groupings that the experimental participants attempted to alphabetize (out of 50) was 11.57 on an average of 19.84 attempts. For control participants the standard deviation (SD) for number of attempted groupings (out of 50) was 11.31 out of 19.39 average completed attempts. The sample size required to achieve statistical significance at those levels of SD paired with the level of differences in sample mean performance would measure in the thousands.

Furthermore, while some heteroskedasticity was discovered among pilot PCS-statement category data while testing for homogeneity (and were subsequently analyzed using additional robust Welch and Forsythe equality of means testing), the performance data overall passed Levene’s test. Once the heteroskedastic pilot data was tested to
accommodate for the heteroskedasticity within, one PCS statement category (HTB, where experimental participants expressed a happiness to be working on AMT) approached the .05 alpha of statistical significance (p = .08).

Despite the lack of statistical significance, this work should be considered valuable as a reference point. Finding any difference at all, in the expected direction, is within itself notable given how tiny the actual cohesion-inducing treatment was (i.e., a self-statement of only a few lines) and how short-term the perceived association with their teammates was (i.e., less than half an hour).
Author’s Biographical Sketch

Matthew H. Hagen was born and raised in West Des Moines, IA. He was a Phi Beta Kappa undergraduate of Luther College and an F.W. Olin Scholar at Babson College where he earned his MBA.

He has thus far spent the majority of his adult life on the East Coast working for IBM where he has received the honor of being elected to IBM’s elite Business & Technical Leadership Program. Over the course of his career he has served as the Planning Coordinator for IBM’s Software Solutions Group worldwide, the Senior Financial Analyst in charge of pricing & investment strategy for IBM’s Social Portfolio worldwide, and as a Senior Product Line Manager & IBM Thought Leader for IBM’s Commerce Group worldwide.

During this period he simultaneously pursued a Masters of Liberal Arts in Psychology at Harvard University through its Division of Continuing Education.

In addition to his various corporate and academic achievements, Matthew had the honor of performing in Carnegie Hall at age 17, being a recipient of the Gold Medal of Achievement for early adulthood achievement (2002), awardee of the Erdman Prize for Entrepreneurship (2006), winner of the HEBS “Personal Brand Elevator Pitch” Competition (2012), winner of IBM’s “Trusted Business Advisor” Business Case Competition for his “US Operations Cash Model” (2013), and currently sits on the Board of Directors for the Nature Walks Conservation Society (a federally recognized 501c3 non-profit).
Dedication

To those who stood by me through thick and thin.
Acknowledgements

I want to take this moment to acknowledge the countless individuals who have played invaluable roles in helping me get to where I stand today. I have been blessed with the good fortune of having spent the majority of my life surrounded by incredibly gifted people and have been luckier still to have been able to do so across a myriad of subject matter. I would first and foremost like to thank my Thesis Director Professor Robert Kegan and the Harvard ALM Program’s Behavioral Sciences Research Advisor Dante Spetter. Without their tireless patience, guidance, and steadfast devotion to my success this wouldn’t have been possible. I would also like to thank all the faculty (across my scholastic background) who consistently went out of their way to make the most of my educational experience, my mentors, my friends, my girlfriend, and my family, as well as The IBM Corporation, for helping kindle my intellectual curiosity and for their continuous support. Many incredible people have gone to painstaking lengths to help me along my journey as I strive towards becoming a better businessman, scholar, and human being. And I thank you all again (as always).
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“Social Loafing” (as an unintended byproduct of team-oriented tasks) has been researched for well over 100 years originating with the work of Max Ringelmann in the 1880’s (Kravitz & Martin, 1986). It is a psychological phenomenon associated with reductions of motivation and productivity relative to increases in group size and a multitude of other variables to be discussed (Karau & Williams, 1993) and it is a crucial psychological dimension required for understanding human behavior in group settings.

Virtual environments have brought about a new platform to research this behavior. One Stanford University study examined performance outcomes of a population of 249 Chinese telemarketers from the Chinese firm CTrip Corporation over 9-months by bifurcating the sample population and comparing the work of individual contributors working from home vs. those working in traditional settings (Bloom, Liang, Roberts, & Ying, 2013). Among those who worked remotely performance increased by 13% (22% in self-selecting groups) and attrition dropped by 50%, but career advancement (promotions, etc.) also dropped by half (Bloom et al., 2013). Collaborative human efforts and technology are quickly merging but through increased self-disclosure (resulting in heightened cohesion and identifiability) it may be possible to ameliorate issues of both.
Motivation & Demotivation

“Social loafing…describes a person (sic) who provides less than maximum possible participation or effort due to motivation and circumstance…In other words, the motivational reason for reducing effort has been associated with individuals’ perceptions that their contributions do not make a difference, while the circumstantial reason for this phenomenon has been linked to environmental difficulties in identifying individual contributions.” (Chidambaram & Tung, 2005, page 150).

Motivation, or more precisely the reduction of motivation, has been the primary focus of much of the social loafing research to date (Karau & Williams, 1993). There is evidence that individuals need groups in order to engage in self-observation and fulfill inherent needs such as the need for belonging (Karau & Williams, 1993). These needs are used as components in many of the theories used to explain loafing itself. Therefore it is important to understand the motivating factors when attempting to understand social loafing.

While some dimensions of motivation are stable, motivation can be influenced by environment. Research by Amabile and colleagues using Factor Analysis of responses of student and working adults to the Work Preference Inventory (which uses intrinsic vs. extrinsic based questions to assess motivational orientations) suggests that some dimensions of motivation are trait-like (total n= 13,351, with \( df \) of 399 and 404 for 2-factor and 4-factor models respectively) (Amabile, Hill, Hennessey, & Tighe, 1994). However, Kyndt and colleagues found motivation overall is not an unwavering personality trait by using stepwise regression to evaluate the changes in 128 second-year educational sciences students’ learning motivation relative to varied levels of perceived workload/complexity (n =128 [122 females, 6 males], t-levels ranging from -3.944 to
6.478 when using stepwise regression for the variables high workload, high vs. low task complexity, and the deep vs. surface levels of learning motivation that resulted (Kyndt, Dochy, Struyven, & CASCALLER, 2013).

Participation motives are often thought of in two categories: personal and social (Sun, Fang, & Lim, 2012). Social motives include advancing the community or organization, creating a sense of belonging, and helping craft one’s social identity (Sun et al., 2012). This has been explored by researchers such as Sun and colleagues who found that among participants in transactional online communities representing wide-ranging demographics, task complexity, self-efficacy, and intrinsic vs. extrinsic motivation can play material mediating and moderating roles (2012). They used moderated multiple regression (MMR) and Chi-Square analysis to analyze the results of a field survey of 700 randomly selected Chinese subjects (205 of whom participated and whose responses were usable) who participated in IT-related tasks posted to Taskcn.com (a Chinese equivalent of Amazon’s Mechanical Turk) (with model $R^2$s ranging from .161 to .397 and t-statistics for these variables ranging from 7.68 to 16.12) (Sun et al., 2012). Personal motives are often subdivided into extrinsic motives (such as monetary gains, preservation/improving of one’s image/reputation, other external motivators) and intrinsic motives where the act is engaged in because it is enjoyable, leads to learning/improvement, and/or helps improve one’s sense of self-worth (Sun et al., 2012).

Many factors influence motivation and effort. Roets and colleagues used the WHO’s Likert-Type 5-item General Well-Being Index to analyze Chinese (n = 218), European (n = 263), and American (n = 307) cultural groups to show that having numerous choices increases the chances that a superior solution can be obtained and
increases feelings of well-being and autonomy but can be diminished by individual attributes such as a quest for perfectionism (Roets, Schwartz, and Guan, 2012). It is known from Iyenger and Lepper that too many choices can be demotivating; one example cited was when Proctor & Gamble decreased the number of shampoos it had available for sale from 26 to 15 their global sales of shampoo increased by 10% (Iyengar & Lepper, 2000).

In terms of productivity, being a member of a group or project team has varying outcomes. For example, in decision making situations some have argued that the inclusion of all group members is an ethical imperative, while others have argued that not only is it not an ethical imperative but that in many instances it is detrimental (both to group and individual) to include all participants in decision making (Lock, Schweiger, & Latham, 1984). For instance, it does not make sense to include individuals in decision making outside of their expertise, or in which they lack proficiency and/or knowledge about the subject at hand, or where their input will lead to poorer quality decisions (Lock et al., 1984).

Lastly, although an increase in satisfaction may be expected relative to an individual’s ability to participate in planning and decision making, there is actually no direct relationship between job satisfaction and job performance or productivity (Lock et al., 1984). After reviewing performance data, researchers found that the greatest means of increasing a group’s productivity was to fire the least motivated members (Lock et al., 1984), which also led the remaining employees to fear potentially losing their jobs (Lock et al., 1984).
Motivation and social loafing are inseparable as loafing is itself a byproduct of reduced motivation, and its study is a measured examination of the reductions in performance that result from individuals operating in groups. These reductions in motivation are driven by a myriad of factors. Therefore identifying variables that change motivation itself is also crucial to the investigation of social loafing.

Social Loafing

Max Ringelmann in the 1880s (Kravitz & Martin, 1986) evaluated work efficiency of various work contributors, from horses and oxen to people and machines, in different work positions and combinations (Kravitz & Martin, 1986). He had men, ranging from a single individual to groups as large as 28 men, pull on a 5 meter rope attached to a dynamometer to measure the peak force exerted (Kravitz & Martin, 1986). He discovered that the force exerted by a group of men was consistently less than the sum of the individual men’s exertion and that this delta increases with increases in group size (Kravitz & Martin, 1986; Suleiman & Watson, 2008).

He observed a similar phenomenon with other tasks also, such as when turning a large circular mill crank. Initially it seemed these must be coordination losses but despite attempts to overcome them through the addition of harnesses, joined singing, etc., they persisted (Kravitz & Martin, 1986).

Steiner (1972) suggested that reduced motivation due to diffusion of responsibilities might better explain the reduced productivity (Karau & Williams, 1993; Suleiman & Watson, 2008). Ingham, Levinger, Graves and Peckham (1974) tested this hypothesis using ANOVA, a rope-pulling task, and six-member pseudogroups of subjects
ranging from young boys (n = 4), to college students (n = 17), and men (n = 7) and found that there are motivational losses beyond coordination losses and diffusion of

Table 1

“Results of Individual and Group Conditions”

<table>
<thead>
<tr>
<th>Individuals in Group</th>
<th>Individual Efforts (Sum)</th>
<th>Group Effort</th>
<th>Group/Individual Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-07</td>
<td>764.0</td>
<td>480.0</td>
<td>0.628</td>
</tr>
<tr>
<td>08-14</td>
<td>516.0</td>
<td>432.0</td>
<td>0.837</td>
</tr>
<tr>
<td>15-21</td>
<td>533.7</td>
<td>435.4</td>
<td>0.815</td>
</tr>
<tr>
<td>22-28</td>
<td>575.5</td>
<td>471.2</td>
<td>0.818</td>
</tr>
<tr>
<td>15-28</td>
<td>1,109.2</td>
<td>858.9</td>
<td>0.774</td>
</tr>
</tbody>
</table>

Note. “These are the data as presented by Ringelmann (1913b). Effort exerted is given in kilograms. Note that the number of significant digits given varies, and in two cases the group/individual ratio is off by .001.” (Kravitz & Martin, 1986, page 938)

Attempts to explain why individual effort declines in groups have encompassed theoretical accounts of social loafing that are wide ranging. They include Latané’s “Social Impact Theory” (Latané, 1981) where participants and those around them are participating in the greater exchange of “social impact” by simultaneously serving as targets and/or sources of social impact. As well as models such as Jackson and Williams’
“Arousal Reduction” theory which suggests that in situations when more individuals are engaged in an activity it actually disproportionately reduces the arousal that would motivate the individual onward had he been the only participant and the rest were instead observers (Jackson & Williams, 1985). Other researchers attribute this arousal reduction to a reduction in “evaluation potential” where the individual’s performance is partially concealed by the presence of the group.

Social Loafing has been found to be consistent and generalizable across a large number of populations and both physical and mental tasks including brainstorming, running, signal detection, rowing, reacting to proposals, pumping air, evaluation / judgment tasks (Hardy & Crace, 1991), quality ratings of editorials, quality ratings of clinical therapists, quality ratings of poems, vigilance tasks on a computer screen, negotiating mazes, and swimming (Karau & Williams, 1993), rope pulling and mill churning (Kravitz & Martin, 1986), work tasks, shouting, and clapping (Suleiman & Watson, 2008). Results have been consistent across a broad range of tasks, group formats, and locations.

One variable that consistently influences the degree of social loafing is group size (Kravitz & Martin, 1986). As group size increases so does social loafing (Karau & Williams, 1993; Hardy & Crace, 1991). When Suleiman and Watson examined social loafing in technology-supported teams in 2008 they had 332 undergraduate business students broken into groups of 8 to 16 members and used ANOVA and a 3 x 2 x 2 factorial design paired with a modified General Management In-Basket Task (GMIB). Participants were faced with a scenario where they were to assume the position of VP – General Manager of the Space Electronics Division of a major research organization and
work their way through a series of in-basket correspondences with various business deliverables and determine what actions they and their staff should take to complete them. The researchers found that the incremental change in loafing relative to group size is not linear, rather it continues to rise albeit at a slower rate as group size increases ($p < .0001$) (Suleiman & Watson, 2008).

The evaluation potential of the individual participant, which reflects the degree to which their contributions are identifiable, also mediates social loafing (Williams, Harkins, & Latané, 1981) and is crucial to the proposed investigation. Williams, Harkins, and Latané used a 5-second shouting task with college males (as individuals and in groups of two and six) and paired this data with a 3 x 3 x 2 ANOVA to show a marked difference between dyads who could easily identify the contributions of their partner (and shouted at 59% of their potential) vs. those shouting in groups of six and whose efforts were partially obscured by the scale of the group (and who shouted at 31% of potential); with $p < .01$ and $F$-values ranging from 5.25 to 16.4. The effect of individual identifiability is so powerful that in some studies evaluation, or even the perception of evaluation, eliminated social loafing altogether (Karau & Williams, 1993). This is attributed in part to the reduction of “deindividuation” (Miller, 2002; Hardy & Crace, 1991; Chidambaram & Tung, 2005).

Group cohesion (sometimes referred to as “group valence” in the literature), also plays a role. Suleiman and Watson’s 2008 research also found that unlike the preponderance of prior co-located group studies, identifiability didn’t impact the loafing rate ($F = 1.73, p = 0.19$). They attributed their findings to the transient nature of the groups (lack of familiarity, cohesiveness, and respect among the members, etc.)
Karau and Williams conducted a meta-analysis in 1993 to look at variables most influential to social loafing. One of the major categories for their review was group valence, which included cohesion, the perceived prestige of the group’s membership, and the strength of social ties within the various studies. They found that loafing was lower when valence was high \( (p < .01, \text{mean weighted effect size} = -0.17, 95\% \text{ CI for } d \text{ of } -0.41 \text{ to } 0.08) \) and moderate \( (p < .001, \text{mean weighted effect size} = 0.25, 95\% \text{ CI for } d \text{ of } 0.08 \text{ to } 0.42) \), concluding that when “taken together, these findings suggest that enhancing group cohesiveness or group identity might reduce or eliminate social loafing” (Karau & Williams, 1993, page 696). Shiue, Chiu, and Chang found through confirmatory factor analysis, convergent validity testing, and Chi-Square analysis that the absence of cohesion was correlated with higher levels of social loafing (average variance extracted for social loafing x cohesion was 0.62) (2010). Several other authors have noted the presence of cohesion reduces social loafing (Karau & Williams, 1993; Hardy & Crace, 1991; Suleiman & Watson, 2008). And Evans and Dion, looking specifically at the relationship of cohesion and performance, performed a Chi-square based meta-analysis to show, over 27 studies selected from 317 studies reviewed, cohesion has been found to materially impact performance outcomes (Chi-Square = 28.01, \( p < .05 \) with upper and lower limits of 0.643 and 0.085 respectively) (2012). They found that cohesive groups will, on average, be at the 68th percentile of performance, outperforming the typical non-cohesive group by 18 percentage points (Evans & Dion, 2012). Results of Karau and Williams’ (1993) meta-analysis of over 150 studies, which coded for group cohesiveness ranging from acquaintances to teammates and friends to couples, similarly showed that social loafing was completely eliminated when group
cohesion was high ($p < .001$) (Karau & Williams, 1993, page 696). Similarly, commitment to a group goal positively predicted performance outcomes (Evans & Dion, 2012). However, Evans and Dion found that very high cohesion, which can be a byproduct of extended group tenure, can be counterproductive, and was a predictor of poor performance (2012). In summary, there appears to be an optimal level of cohesion that will reliably result in superior team performance outcomes.

Hardy & Crace (1991) and Hardy & Latané (1988) compared standing vs. ad hoc groups. Hardy and Latané had forty-eight 15 to 17-year old cheerleaders with two to five years’ cheerleading experience engage in a shouting/clapping task while outfitted with blindfolds and earphones and found that pre-existing teams of cheerleaders, who were more likely to have already established a level of cohesion and who would continue to work together in the future, displayed lower levels of social loafing (the differences in group means were 0.96 vs. 0.91; note however that while, given their small sample size of $n = 48$ girls split into dyads, statistical significance was not achieved, $p = 0.15$, this material difference in average loafing is still a relevant finding and likely to have been found significant with proper sample size and power) (1988).

A broad range of other variables have also been investigated, ranging from task valence (which is the perceived prestige of the task), goal setting, making the performance ratings of individuals available to the group, intrinsic importance / personal significance (Suleiman & Watson, 2008), feedback, incentive value, task commitment, group interaction, task difficulty, perceived necessity of efforts (Hardy & Crace, 1991), expectations of co-worker performance (through the phenomenon of “social compensation”) (Chidambaram & Tung, 2005), and task complexity (Sun et al., 2012) to
the uniqueness of each group member’s task and participant testing insight (Karau & Williams, 1993). All of which decrease social loafing. Perceived participant skill on the other hand has been found to increase it (Hardy & Crace, 1991). Age (Karau & Williams, 1993), gender, and culture (Hardy & Crace, 1991; Karau & Williams, 1993; Suleiman & Watson, 2008) also play roles in the degree to which social loafing takes place.

Virtual Collaboration

Research on social loafing in virtual environments is just emerging, has largely taken place in lab settings and thus lacks ecological validity, and has yet to be generalized across most virtual work variables and settings (Chidambaram & Tung, 2005; Karau & Williams, 1993; Liang, Lee, & Jang, 2013; Suleiman & Watson, 2008; Zoghbi-Manrique-de-Lara, 2012). For example Suleiman & Watson (2008), in a 3 x 3 x 2 factorial design considered group size using the General Management In-Basket Task (GMIB) discussed examining social loafing in “virtual teams”. However they used co-located the “virtualized” team (ie they were all in the same room). It is well established that the mere presence of others changes behavior (Guerin, 1985).

Chidambaram & Tung (2005) also investigated social loafing in virtualized teams, specifically investigating performance in co-located vs. dispersed groups, and did so in a manner where the participants were truly isolated from one another, albeit still all in the same building on campus (they were placed into different offices). They did this with an idea-generation task using an Electronic Brainstorming (EBS) software to help participants generate and record potential solutions to a problem their organization was
facing. The ideas generated by members (regardless of whether co-located or dispersed) were seen in real time and were tagged with the contributor’s ID. The only differences between the co-located and dispersed groups were whether or not the members were in the same room and whether or not they could speak to each other in person (the dispersed team members could only speak electronically through the EBS tool). Ultimately it was the responsibility of the teams to cull ideas down to finalized lists of agreed upon potential solutions. Chidambaram and Tung found no difference in performance between virtual and co-located teams engaged in idea generation tasks, but that virtual teams accomplished the tasks more efficiently as they didn’t have the same social pressures to engage in unproductive overt work (which is activity that appears to be productive but adds no value and is done just to appear productive). However, the study’s participants were selected from a homogeneous population of undergraduate business students.

Chidambaram and Tung also observed that while group size was a predictor of perceived cohesion (using the 5-item Seashore’s Index of Cohesiveness) in both types of groups ($p = .006$), participants reported no significant difference in perceived cohesion between the two group types ($p = 0.273$). These results were counterintuitive given Chidambaram and others had found earlier that “greater geographic distance among members has been shown to alter a group’s circumstances in many ways, including the time needed to develop relational ties…[and]…the speed with which trust develops” (Chidambaram & Tung, 2005, page 152). Research has also shown that human participants interact with computers differently based upon variables such as the participant’s mood and the sex of the computer’s voice (Liang, Lee, & Jang, 2013). This shows the mixed findings in virtual group research to date and what Liang, Lee, and Jang
refer to as the “mindlessness” of humans in how they treat computers as social actors (or at least facilitators of social actors). Humans’ perception of computers as social actors was thought to potentially give additional support to this thesis’ experiment’s ability to develop perceived cohesion to reduce loafing and therefore increase performance in virtual groups (even though in reality that cohesion may not yet exist).

Neither Suleiman and Watson nor Chidambaram and Tung attempted to improve performance by manipulating cohesion (although Chidambaram & Tung, 2005, did measure cohesion using Seashore’s Index of Cohesion) and both these studies utilized a limited, hypothetical task.

Given its nascence as a field, research of social loafing in virtual environments is still uncovering unique nuances and discovering new challenges. Research results have often been mixed. For instance, Suleiman and Watson (2008) found that, unlike with other prior co-located group research, those participants in virtualized settings seemed indifferent to identifiability ($p = 0.34$) and to loaf “significantly more” when they received feedback ($p < .0001$) (Suleiman & Watson, 2008). They however discovered “a sizeable and significant interaction” among their variables and “urge[d] interpretation with caution” (Suleiman & Watson, 2008, page 302). It should be noted that their identifiability was solely a participant’s name and nothing else. They suggest that under certain circumstances, identifiability in virtual environments may not mitigate loafing in the same way as physical teams but this may be due to lack of cohesion (Suleiman & Watson, 2008). Perhaps this is driven by the transitory nature of virtualized relationships or maybe without building any form of identity in the context of team cohesion the identifiability does not mean much to the participant.
Despite the potential application of social loafing research to virtual groups, no research to date has examined social loafing in virtualized groups of geographically dispersed heterogeneous participants (i.e., how virtualized teams are often structured in reality in the field). While it can be expected that the same factors that influence social loafing in co-located groups will affect virtual groups, no study has experimentally manipulated group cohesion in virtualized collaborative groups.

Research on virtualized collaboration looked solely at participants in individual contributor roles (as call-center associates) and their findings were remarkable. For example, Bloom, Liang, Roberts, and Ying (2013) wanted to address Senior Managers’ fears about “shirking” (a corporate loafing synonym) because of a concern that employees would be beyond the watchful eye of their supervisors when afforded the ability to work from home. A sample of 249 individuals from the employees of a 16,000 person Chinese call center were randomized to work from home for a 9-month trial experiment and their individual changes in performance were measured (Bloom et al., 2013). Compared to those who continued working from the call center site (the control) those who were allowed to work from home (the experimental population) experienced a 13% increase in performance with no impact to work quality and a 50% decrease in attrition (Bloom et al., 2013). Those who worked from home also reported higher satisfaction with their work (Bloom et al., 2013). These results were replicated with a second Chinese call-center and results were essentially identical (Bloom et al., 2013). After the completion of the initial study, the entire workforce of this company was allowed to select where they worked from and the performance of those choosing to work-from-home rose 22% over the in-office population (Bloom et al., 2013).
Many virtual communities are commercial in nature (designated as “TVC’s” or “Transactional Virtual Communities”) (Sun et al., 2012) and serve as marketplaces for services such as Taskcn.com and Amazon’s Mechanical Turk, where individuals of varied backgrounds come together as individual contributors to take part in work tasks, posted by companies all over the world, to earn monetary rewards (Sun et al., 2012). Given increasing costs of employing people the latter of these formats is growing in popularity in a movement referred to as “crowdsourcing”, which “is a new outsourcing approach that takes tasks as an open call to an undefined, large group of people” (Sun et al., 2012). Modern experimenters have found that these communities, when used as experimental data sources, produce data consistent with those collected from traditional undergraduate lab settings (Buhrmester, Kwang, & Gosling, 2011; Bates & Lanza, 2013).

The benefits of virtual collaboration, including the cost savings of working remotely, are numerous. Technology has been shown to bring about a more global perspective and enhance the ability to think critically (Huffman, Whetten, & Huffman, 2013). As richer channels are used (that is to say mediums with more robust dimensions such as teleconferencing instead of just instant message chatting) participants generally had lower motivation loss and higher decision-making efficiency (Sin, 2011) so there is an economic incentive for the technology to progress.

Ten percent of US citizens work from home at least one day a week. While remote workers used to see income impairment, compensation differences disappeared by the year 2000 (Bloom et al., 2013). Technology affords researchers, employers, and instructors a way of increasing identifiability and ease of rendering feedback (Suleiman & Watson, 2008). These factors conveniently give one an opportunity to potentially
reduce deindividuation by increasing individual evaluation potential and therefore
decrease loafing.

In conclusion, in virtual groups, as in co-located groups, cohesion, increased
evaluation potential, and decreased deindividuation reduce social loafing and increase
productivity. Therefore it was expected that participants who believed they had been
introduced to their co-workers would perceive the groups to be more cohesive, and that
they as individuals had become more identifiable, and that they therefore would work
harder and be more productive.
Chapter II

Research Method

The following sections include a review of the definition of terms and highlight the details of participant selection, procedure, design, measures, and analysis plan that went into preparation of the experiment discussed herein. They are intended to provide the reader with the ability to better understand and, if needed, replicate this study in the future.

Definition of Terms

A Virtual Community: is “an aggregation of individuals or business partners who interact around a shared interest, where the interaction is at least supported and/or mediated by technology and guided by some protocols or norms” (Sun et al., 2012, page 13).

Coactive Task: is a task in which the performance of individuals within a group (as well as the group as a whole) is measured (Karau & Williams, 1993).

Collective Task: is a task in which the performance of the group (but not the individuals within it) is measured (Karau & Williams, 1993).

Deindividuation: is a state in which “individuals are extricated from responsibility for their actions simply because they no longer have an acute awareness of the identity of
Social loafing: “Is the reduction in motivation and effort when individuals work collectively compared with when they work individually or coactively” (Karau & Williams, 1993, page 681).

Participants

Two-hundred participants were recruited through Amazon’s Mechanical Turk (AMT), to assist with an alphabetization task for an internal directory for a fictitious company. AMT is an online services site that has been shown to render data consistent with those collected in traditional undergraduate lab settings (Buhrmester et al., 2011; Bates & Lanza, 2013) and allows individuals from all over the world to work on uploaded tasks. 100 non-self-disclosing control tasks and 100 self-disclosing experimental jobs were listed on AMT. Participants signed up to work on a single task, and were not told that it was an experiment (these tasks were constructed to be relatively indistinguishable from any other AMT tasks that participants would be engaged in completing) until being debriefed after the completion of the task. Participants were compensated for their participation in the 20-30 minute task at a rate of $6/hr (the going rate on AMT for tasks of this nature). The only personal information shared was the information experimental subjects chose to share with their team. Their individual
performance and all individual identifiers (such as Worker ID and any information the subject chose to share) were kept confidential.

Procedure

After receiving approval from the Harvard Committee on the Use of Human Subjects, participants were recruited through AMT as discussed above. Amazon Mechanical Turk workers are tiered into recreational and elite level workers referred to as “Masters”. For purposes of ensuring quality submissions, tasks were posted in a manner that all workers recruited were of a “Masters” designation.

Given the goal of maintaining ecological validity (McCreery, Schrader, Krach, & Boone, 2013), AMT was an appropriate platform for participant recruitment and task completion. Participants’ tasks in this experimental protocol were indistinguishable from any other task they would complete on AMT.

Each of the experiments were uploaded to AMT as a Writing task that had Categorization and Alphabetization advertised as key words. The recruiting advertisement specified that each participant could only sign up once. Upon selection of one of the tasks they were asked to sort short lists of companies alphabetically using acronyms composed of the first initials to the company’s full name.

As the tasks were completed the protocol data was downloaded from the AMT dropbox and scored by hand. All responses were screened to ensure quality submissions, that instructions were followed, that no individual completed more than one task, that the time taken was consistent with instruction, etc. Following screening, payment was rendered to participants and the data was analyzed.
Design

Pseudogroups are those where the participant believes s/he is working in a group when in reality there is no group (Suleiman & Watson, 2008). Pseudogroups were utilized to remove any chance of conflating loafing with coordination losses (which are performance drops as a byproduct of inefficiencies of working together) (Karau & Williams, 1993). Hypothetical group size was small (in this case five participants) in order to mimic the size of a typical working group and because self-disclosure was believed to carry a higher perception of evaluation potential in a small group.

The assigned task was appropriate for this investigation because it could not be automated easily and participants had little incentive to build formulas rather than complete the task manually. Furthermore, instructions specified that no automation was allowed. Each participant was given the same task list of 50 groups with five company names apiece. This length (50 x 5) was constructed by this researcher to be an impossible task to complete in its entirety in 20 minutes without automation; therefore participants who completed all 50 groups correctly in the 20 minute allotment were removed to guarantee the task had been done manually as instructed. A 20-minute deadline is consistent with AMT working culture as many assignments (referred to as “HITS”) are designed to be 10 to 30 minutes in duration and all HITS have specified time allotments.

Company names were generated by taking a list of US companies from http://en.wikipedia.org/wiki/List_of_companies_of_the_United_States and then breaking them into one word components and subsequently mixing and matching them randomly using an Excel algorithm designed by this researcher. Therefore, all company names were fictional and they were always three words long.
The instructions varied by group (control vs. experimental) and in addition to the methodology explained above contained the following guidance…

Control Condition Instructions:

You’re the final member of a five-person team engaged in this type of task. The work you do, while tied to you, will be combined with theirs in the final product and any remaining groupings you don’t get to in the time allotted will be finished off by one of them.

In the text box at the bottom, alphabetize as many of the following group lists as you can within 20 minutes. Set a timer, it is vital that you do not exceed 20 minutes on the activity itself (it’s okay if you don’t get all the way through the lists; just mark with an asterisk (*) where you stop). Absolutely no automation (formulas, macros, VBA, etc.) allowed.

Experimental participants received the same instructions except that they had to prepare a quick introduction (i.e., engage in self-disclosure) and read the introductions of their other four “Group” members in advance of the 20 minute exercise (these introductions were drafted in advance and were standard among Experimental Group recipients):

But first, before beginning the 20-minute task activity, please take a moment to share a little about yourself for your teammates to read. Here are what your four teammates posted, please take a moment to read and familiarize yourself with your team:

I’m Jack. I’m tall (over 190cm) and live in Sweden,. I love football and handball and orienteering.

My name is Samantha. I’m a stay-at-home-mom and I live in the US. I love MTK because it allows me to pick up some extra cash on the side. I <3 it!

Georrig – Wie gehts. Germany checking in. Plugging away as always.

Greetings. I’m Pallavi. While I wrote my MBA in the US I’m based out of Mumbai.

Before beginning the task please insert a little about yourself for your teammates to read:
In this experiment self-disclosure was the experimental variable expected to lead
to differences in performance through reduced social loafing and therefore the
performance was the dependent variable being measured.

To assess experimental validity of the cohesion manipulation, this researcher
conducted a pilot test of 10 participants from each group (experimental, control) to
evaluate the effectiveness of the introduction manipulation on scores of the Perceived
Cohesion Scale (PCS) (Bollen & Hoyle, 1990). PCS has been shown to successfully
measure perceived cohesion in small transient groups like those in this thesis’ experiment
(Chin, Pearson, & Stollak, 1999) and was included as an additional 5-minute final
requirement at the bottom of the pilot tasks.

In accordance with the originating 1990 work of Kenneth Bollen and Rick Hoyle,
this study used the Perceived Cohesion Scale (PCS), a six-question, Likert-based (0-10,
with 10 representing the highest agreement) questions:

Table 2

Perceived Cohesion Scale (PCS)

*Sense of Belonging*
I feel a sense of belonging to ________.
I feel that I am a member of the ________ community.
I see myself as a part of the ________ community.

*Feelings of Morale*
I am enthusiastic about ________.

*I am happy to be at [live in] ________.*
*_______ is one of the best schools [cities] in the nation.*

Note. (Bollen & Hoyle, 1990). Used with permission from Kenneth Bollen and Rick Hoyle.
Given Amazon Mechanical Turk is a transactional online work community the questions was tailored accordingly:

Table 3
Perceived Cohesion Scale (PCS) for Amazon Mechanical Turk

Sense of Belonging
I feel a sense of belonging to ___ My Team ___.
I feel that I am a member of the ___ Amazon Mechanical Turk ___ community.
I see myself as a part of the ___ Amazon Mechanical Turk ___ community.

Feelings of Morale
I am enthusiastic about ___ Working Online ___.
I am happy to be at ___ Amazon Mechanical Turk ___.
___ Amazon Mechanical Turk ___ is one of the best working communities in the world.

It was delivered in context as follows:

Thanks for helping us out with this task. Please indicate your feelings on a scale of 0 to 10 (with 0 representing the highest disagreement with the statement and 10 representing the highest agreement with the statement) next to the following statements:

Sense of Belonging
I feel a sense of belonging to my team. ___
I feel that I am a member of the Amazon MechanicalTurk community. ___
I see myself as a part of the Amazon Mechanical Turk community. ___

Feelings of Morale
I am enthusiastic about working online. ___
I am happy to be at Amazon MechanicalTurk. ___
Amazon MechanicalTurk is one of the best working communities in the world. ___

Thanks for your input!

This researcher received written permission to use the PCS from both the authors.
Measures

Each participant was given a standardized list of 50 sets of names with each set containing five different three-word company names to alphabetize by the names’ acronyms. Responses were scored as receiving 1 point for each set of names that is correctly alphabetized with a maximum of 50 points in the event that all 50 sets of names are alphabetized correctly. Given all participants were afforded 20 minutes to complete as many grouping as possible, an individual’s performance was defined as the total number of points earned from correctly alphabetizing the sets. All participants’ task times were recorded by AMT and therefore could be screened for general compliance with total allotted time instructions.

Analysis Plan

Upon completion of data collection, a Between Groups One-Way Analysis Of Variance (ANOVA) was used to compare the mean task performance of the experimental vs. control groups as well as differences in their responses to the Perceived Cohesion Scale (PCS) among the participants it was collected for. It was expected that experimental group participants would have higher average task scores than control participants and that experimental participants would perceive a greater sense of cohesion.

As with the collection of any set of data there were anomalies in some of the responses received from participants who did not follow instructions. Several participants misunderstood the meaning of “alphabetization” and confused it with the act of creating acronyms. Others responded to the Likert-Scale-based (0-10 point) Perceived
Cohesion Scale with “yes” / “no” responses. Given the placement of only one text box for purposes of providing responses, some participants completed the alphabetization task to the best of their ability but then failed to respond to the Perceived Cohesion Scale component, submitting a response to a pilot posting in a manner that was consistent with the non-pilot postings (i.e. without the PCS survey). In these events the submissions were categorized (for purposes of analysis) as the type of task they were completed as (i.e. a Control PCS condition submitted without a PCS survey was treated as a Control submission). This was deemed an appropriate approach given the alphabetization task itself was strictly limited to 20 minutes regardless of the task the participant was involved in (Experimental Pilot (EP), Control Pilot (CP), Experimental (E), or Control (C)).
Chapter III

Results

Differences in quantity and quality of performance, and differences in morale (although not cohesion itself), were all in the expected direction, though none achieved levels of statistical significance driven largely by large variances in performance within the datasets. The standard deviation (SD) for number of correct answers out of 50 for experimental and control subjects was 9.73 and 9.566 on average attempts of 19.8442 and 19.393 alphabetized groupings respectively. A sample size required to achieve statistical significance at these levels of performance differences and these levels of standard deviation would measure in the thousands. However, even in the absence of statistical significance this research should be considered a valuable point of reference for future researchers.

Of the 200 total tasks (100 experimental, 100 control) posted to Amazon Mechanical Turk, 166 remained (77 experimental, 89 control) in the analysis after removing submissions that didn’t follow instructions (e.g. submissions with acronyms only, attempts made at alphabetizing the individual pieces of each of the 3-piece company names, alphabetizing entire list of 250 entries regardless of groups, mixing company names among the groups, second attempts made by a couple participants).
Pilot (n = 18)

In an effort to evaluate both the proposed experiment and to test for cohesion manipulation, the initial pilot tasks also included a survey with the Perceived Cohesion Scale. The results of this pilot (n=18), while not statistically significant, directionally supported both the hypothesis and the effectiveness of the cohesion manipulation. EP plot participants averaged 21.38 correct responses on the alphabetizing task vs. the CP participants’ 14.80 of 50, a full 44.4% difference (F(1, 16) = 1.38, p > .05). Furthermore, because participants accomplished different numbers of attempts at alphabetizing the potential 50 groups, it became evident that EP participants were also outperforming CP participants in the number of correct answers per task attempt by 4.275% (21.38 correctly alphabetized groupings out of 23.63 group alphabetization attempts on average, or 90.00% accuracy, among EPs vs. 14.81 correct out of 16.70 group alphabetization attempts on average, or 86.31% accuracy, among CPs; F(1, 16) = 1.48, p > .05) in addition to surpassing them in number of correct submissions overall. Not only were experimental (i.e., self-disclosing) subjects outperforming control subjects in number of correct answers, they were also more efficient at creating those numbers by making fewer mistakes.

In the “Sense of Belonging” category (SOB+MOC+POC) (composed of responses to statements of “I feel a sense of belonging to my team” (SOB), “I feel that I am a member of Amazon Mechanical Turk community” (MOC), and “I see myself as a part of the Amazon Mechanical Turk community” (POC)), EP participants scored 4.07% higher than CP participants with responses cumulatively averaging scores of 23.00 of 30 among EP participants vs. 22.10 of 30 among CP participants (F(1, 16) = .19, p > .05).
Within the three statements comprising the “Sense of Belonging” category the SOB+MOC+POC the “I feel a sense of belonging to my team” (SOB) statement itself saw EP participants underperforming by 11.02% with an average 5.25 of 10 vs. 5.90 among CP participants (F(1, 16) = .21, p > .05). In the "I feel that I am a member of the Amazon Mechanical Turk community” (MOC) statement EP subjects outscored CP participants subjects by 10.94% with averages of 8.88 of 10 vs. 8.00 among CP participants (F(1, 16) = 1.56, p > .05). In the "I see myself as a part of the Amazon Mechanical Turk community" (POC) statement, EP subjects once again outperformed CPs, this time by 4.07%, with an average statement score of 8.88 of 10 vs. 8.20 of 10 among CP participants (F(1, 16) = 1.14, p > .05).

In the “Feelings of Morale” category (EAW+H2B+OOB) (composed of responses to statements of “I am enthusiastic about working online” (EAW), “I am happy to be at Amazon Mechanical Turk” (H2B), and “Amazon Mechanical Turk is one of the best working communities in the world” (OOB)), EP participants again outperformed CPs and did so by 14.88% with an average cumulative score of 26.25 of 30 vs. 22.85 of 30 among CP participants (F(1, 16) = 1.64, p > .05). In the “I am enthusiastic about working online” (EAW) statement EP participants outperformed CP participants by 12.75% with average scores of 8.63 of 10 vs. 7.65 among CP participants (F(1, 16) = 1.25, p > .05). In the “I am happy to be at Amazon Mechanical Turk” (H2B) statement again EP participants outperformed CP participants by 18.67% with average scores of 9.38 of 10 vs. 7.90 of 10 among CP participants (F(1, 16) = 3.05, p > .05). In the “Amazon Mechanical Turk is one of the best working communities in the world” (OOB) statement EP participants outperformed CP participants by 13.01% with average scores of 8.25 of
10 vs. 7.3 among pilot control participants (F(1, 16) = .70, p > .05). The potential reasons behind these outcomes will be discussed in detail in the discussion section to follow.

Table 4

Definitions of PCS Data Abbreviations in Tables

<table>
<thead>
<tr>
<th>Abbreviation In Tables</th>
<th>PCS Statement Subjects Responded To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense Of Belonging Category (SOB+MOC+POC)</td>
<td>Sense of Belonging” Category sum of components; SOB + MOC + POC</td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
<td>“I feel a sense of belonging to my team.”</td>
</tr>
<tr>
<td>Feeling Like a Member Of AMT Community (MOC)</td>
<td>“I feel that I am a member of the Amazon Mechanical Turk community.”</td>
</tr>
<tr>
<td>See Self as Part Of AMT Community (POC)</td>
<td>“I see myself as a part of the Amazon Mechanical Turk community.”</td>
</tr>
<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
<td>“Feelings of Morale” Category Sum of components; EAW + H2B + OOB</td>
</tr>
<tr>
<td>Enthusiastic About Working (EAW)</td>
<td>“I am enthusiastic about working online.”</td>
</tr>
<tr>
<td>Happy To Be on the Team (H2B)</td>
<td>“I am happy to be at Amazon Mechanical Turk.”</td>
</tr>
<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
<td>“Amazon Mechanical Turk is one of the best working communities in the world.”</td>
</tr>
</tbody>
</table>

Note. All scores are on a Likert 0-10 Scale with 0 = lowest & 10 = highest)

Table 5

Descriptive Statistics of Pilot Experimental Subjects

<table>
<thead>
<tr>
<th>Variable (n = 8)</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
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<tbody>
<tr>
<td>Performance Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td>0.84</td>
<td>14.0%</td>
<td>98.0%</td>
<td>47.3%</td>
<td>0.27</td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
<td>42.00</td>
<td>7.00</td>
<td>49.00</td>
<td>21.38</td>
<td>13.46</td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td>43.00</td>
<td>7.00</td>
<td>50.00</td>
<td>23.63</td>
<td>13.54</td>
</tr>
<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>42.00</td>
<td>7.00</td>
<td>49.00</td>
<td>21.37</td>
<td>13.46</td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>0.26</td>
<td>74.0%</td>
<td>100.0%</td>
<td>90.0%</td>
<td>0.10</td>
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<td>PCS Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
<td>9.00</td>
<td>1.00</td>
<td>10</td>
<td>5.25</td>
<td>2.92</td>
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<td>Feeling as a Member Of AMT Community (MOC)</td>
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<td>7.00</td>
<td>10</td>
<td>8.88</td>
<td>1.36</td>
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<tr>
<td>See Self as Part Of AMT Community (POC)</td>
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<td>7.00</td>
<td>10</td>
<td>8.88</td>
<td>1.13</td>
</tr>
<tr>
<td>Sense Of Belonging Category (SOB+MOC+POC)</td>
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<td>17.00</td>
<td>30</td>
<td>23.00</td>
<td>4.41</td>
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<tr>
<td>Enthusiastic About Working (EAW)</td>
<td>5.00</td>
<td>5.00</td>
<td>10</td>
<td>8.63</td>
<td>1.85</td>
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<tr>
<td>Happy To Be on the Team (H2B)</td>
<td>2.00</td>
<td>8.00</td>
<td>10</td>
<td>9.38</td>
<td>0.92</td>
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<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
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<td>6.00</td>
<td>10</td>
<td>8.25</td>
<td>1.58</td>
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<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
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<td>20.00</td>
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<td>26.25</td>
<td>3.69</td>
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Table 6

Descriptive Statistics of Pilot Control Subjects

<table>
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<tr>
<th>Variable (n = 10)</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Dev.</th>
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<tr>
<td>Performance Data</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
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<td>8.0%</td>
<td>70.0%</td>
<td>29.6%</td>
<td>0.21</td>
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<tr>
<td>Number of Correct Answers (of 50)</td>
<td>31.00</td>
<td>4.00</td>
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<td>10.30</td>
</tr>
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<td>Number of Groups Attempted (of 50)</td>
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<td>6.00</td>
<td>35.00</td>
<td>16.70</td>
<td>10.63</td>
</tr>
<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>31.00</td>
<td>4.00</td>
<td>35.00</td>
<td>14.81</td>
<td>10.31</td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>0.33</td>
<td>67.0%</td>
<td>100.0%</td>
<td>86.3%</td>
<td>0.13</td>
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<tr>
<td>PCS Data</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
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<td>0.00</td>
<td>10</td>
<td>5.90</td>
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<td>6.00</td>
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<tr>
<td>See Self as Part Of AMT Community (POC)</td>
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<td>Sense Of Belonging Category (SOB+MOC+POC)</td>
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<td>16.00</td>
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<td>1.83</td>
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<td>Happy To Be on the Team (H2B)</td>
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<td>4.00</td>
<td>10</td>
<td>7.90</td>
<td>2.23</td>
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<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
<td>8.00</td>
<td>2.00</td>
<td>10</td>
<td>7.30</td>
<td>2.87</td>
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<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
<td>19.00</td>
<td>11.00</td>
<td>30</td>
<td>22.85</td>
<td>6.72</td>
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</tbody>
</table>

When testing these pilot data for homogeneity using a Levene’s test, some of the data representing scored responses to PCS statements were found to be statistically significant (suggesting that the variances between the groups was heteroskedastic). Therefore a “Robust Tests of Equality of Means” (containing both Welch and Forsythe tests) was included for those categories. Even after correcting for heteroskedasticity of the data, both Welch and Forsythe these data did not result in statistical significance (p > .05).
Table 7

**ANOVA of Experimental Pilot vs. Control Pilot Subjects (n=18)**

<table>
<thead>
<tr>
<th>Variable (n = 18)</th>
<th>SS</th>
<th>MS</th>
<th>F(1, 16)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td>0.077</td>
<td>0.077</td>
<td>1.383</td>
<td>0.257</td>
</tr>
<tr>
<td>Between</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>0.889</td>
<td>0.056</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
<td>192.136</td>
<td>192.136</td>
<td>1.383</td>
<td>0.257</td>
</tr>
<tr>
<td>Between</td>
<td>2223.48</td>
<td>138.967</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>2299.98</td>
<td>143.748</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td>213.136</td>
<td>213.136</td>
<td>1.483</td>
<td>0.241</td>
</tr>
<tr>
<td>Between</td>
<td>2299.98</td>
<td>143.748</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>2299.98</td>
<td>143.748</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>191.217</td>
<td>191.217</td>
<td>1.376</td>
<td>0.258</td>
</tr>
<tr>
<td>Between</td>
<td>2223.76</td>
<td>138.985</td>
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<tr>
<td>Within</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>0.006</td>
<td>0.006</td>
<td>0.445</td>
<td>0.514</td>
</tr>
<tr>
<td>Between</td>
<td>0.22</td>
<td>0.014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PCS Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
<td>1.878</td>
<td>1.878</td>
<td>0.205</td>
<td>0.657</td>
</tr>
<tr>
<td>Between</td>
<td>146.4</td>
<td>9.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling as a Member Of AMT Community (MOC)</td>
<td>3.403</td>
<td>3.403</td>
<td>1.561</td>
<td>0.229</td>
</tr>
<tr>
<td>Between</td>
<td>34.875</td>
<td>2.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>See Self as Part Of AMT Community (POC)</td>
<td>2.025</td>
<td>2.025</td>
<td>1.138</td>
<td>0.302</td>
</tr>
<tr>
<td>Between</td>
<td>28.475</td>
<td>1.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense Of Belonging Category (SOB+MOC+POC)</td>
<td>3.6</td>
<td>3.6</td>
<td>0.185</td>
<td>0.673</td>
</tr>
<tr>
<td>Between</td>
<td>310.9</td>
<td>19.431</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enthusiastic About Working (EAW)</td>
<td>4.225</td>
<td>4.225</td>
<td>1.254</td>
<td>0.279</td>
</tr>
<tr>
<td>Between</td>
<td>53.9</td>
<td>3.369</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Happy To Be on the Team (H2B)</td>
<td>9.669</td>
<td>9.669</td>
<td>3.047</td>
<td>0.1</td>
</tr>
<tr>
<td>Between</td>
<td>50.775</td>
<td>3.173</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Happy To Be on the Team (H2B)</td>
<td>9.669</td>
<td>9.669</td>
<td>3.047</td>
<td>0.1</td>
</tr>
<tr>
<td>Between</td>
<td>50.775</td>
<td>3.173</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
<td>4.011</td>
<td>4.011</td>
<td>0.701</td>
<td>0.415</td>
</tr>
<tr>
<td>Between</td>
<td>91.6</td>
<td>5.725</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
<td>51.378</td>
<td>51.378</td>
<td>1.636</td>
<td>0.219</td>
</tr>
<tr>
<td>Between</td>
<td>502.525</td>
<td>31.408</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 8

*Test of Homogeneity of Variances among Pilot Experimental and Pilot Control Subject populations*

<table>
<thead>
<tr>
<th>Variable (n = 18)</th>
<th>Lavene Statistic</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td>0.263</td>
<td>0.615</td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
<td>0.263</td>
<td>0.615</td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td>0.463</td>
<td>0.506</td>
</tr>
<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>0.257</td>
<td>0.619</td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>2.408</td>
<td>0.140</td>
</tr>
<tr>
<td><strong>PCS Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
<td>0.010</td>
<td>0.920</td>
</tr>
<tr>
<td>Feeling as a Member Of AMT Community (MOC)</td>
<td>0.014</td>
<td>0.908</td>
</tr>
<tr>
<td>See Self as Part Of AMT Community (POC)</td>
<td>0.818</td>
<td>0.379</td>
</tr>
<tr>
<td>Sense Of Belonging Category (SOB+MOC+POC)</td>
<td>0.003</td>
<td>0.958</td>
</tr>
<tr>
<td>Enthusiastic About Working (EAW)</td>
<td>0.014</td>
<td>0.908</td>
</tr>
<tr>
<td>Happy To Be on the Team (H2B)</td>
<td>10.214</td>
<td>0.006</td>
</tr>
<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
<td>4.945</td>
<td>0.041</td>
</tr>
<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
<td>7.083</td>
<td>0.017</td>
</tr>
</tbody>
</table>

Table 9

*Robust Tests for Equality of Means for “Happy To Be on the Team” (H2B), “Perceive Working Community as One Of the Best” (OOB), & “Feelings Of Morale Category” (EAW+H2B+OOB)*

<table>
<thead>
<tr>
<th>Variable (n = 18)</th>
<th>Statistic</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy To Be on the Team (H2B)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welch</td>
<td>3.603</td>
<td>0.081</td>
</tr>
<tr>
<td>Brown-Forsythe</td>
<td>3.603</td>
<td>0.081</td>
</tr>
<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welch</td>
<td>0.795</td>
<td>0.387</td>
</tr>
<tr>
<td>Brown-Forsythe</td>
<td>0.795</td>
<td>0.387</td>
</tr>
<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welch</td>
<td>1.856</td>
<td>0.194</td>
</tr>
<tr>
<td>Brown-Forsythe</td>
<td>1.856</td>
<td>0.194</td>
</tr>
</tbody>
</table>
Experimental vs. Control (n = 166)

The mean performance of the experimental participants was only 1.90% greater (averaging 16.64 of 50 among experimental participants and 16.33 among controls (F(1, 164) = .04, p > .05)).

Additionally the prior efficiencies seen among pilot experimental subjects in which they were outperforming controls (in terms of percentage of attempts that were correct in addition to producing more correct answers in sum) was also largely lost with scale as it dropped to a net accuracy outperformance over control subjects of only 0.38% (F(1, 164) = .03, p > .05).

Unlike as was witnessed in the “I am happy to be at Amazon Mechanical Turk” (H2B), “Amazon Mechanical Turk is one of the best working communities in the world” (OOB), and “Feelings of Morale” Category (EAW+H2B+OOB) PCS statement category data, there were no failures in meeting the homogeneity assumption (i.e., the presence of heteroskedastic data) as is tested by Levene’s. Therefore, additional “Robust Tests of Equality of Means” (Welch, Brown-Forsythe, etc.) testing was not necessary.

Table 10

Descriptive Statistics of all Experimental Subjects

<table>
<thead>
<tr>
<th>Variable (n = 77)</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td>0.88</td>
<td>10.0%</td>
<td>98.0%</td>
<td>33.3%</td>
<td>0.19</td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
<td>44.00</td>
<td>5.00</td>
<td>49.00</td>
<td>16.64</td>
<td>9.72</td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td>44.00</td>
<td>6.00</td>
<td>50.00</td>
<td>19.84</td>
<td>11.57</td>
</tr>
<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>44.03</td>
<td>4.97</td>
<td>49.00</td>
<td>16.61</td>
<td>9.69</td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>0.33</td>
<td>66.7%</td>
<td>100.0%</td>
<td>83.9%</td>
<td>0.11</td>
</tr>
</tbody>
</table>
Table 11

*Descriptive Statistics of all Control Subjects*

<table>
<thead>
<tr>
<th>Variable (n = 89)</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Data</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td>0.74</td>
<td>6.0%</td>
<td>80.0%</td>
<td>32.7%</td>
<td>0.19</td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
<td>37.00</td>
<td>3.00</td>
<td>40.00</td>
<td>16.33</td>
<td>9.57</td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td>46.00</td>
<td>4.00</td>
<td>50.00</td>
<td>19.39</td>
<td>11.31</td>
</tr>
<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>37.00</td>
<td>3.00</td>
<td>40.00</td>
<td>16.26</td>
<td>9.54</td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>0.41</td>
<td>59.0%</td>
<td>100.0%</td>
<td>83.6%</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Table 12

*Test of Homogeneity of Variances of all Experimental vs. all Control Subjects*

<table>
<thead>
<tr>
<th>Variable (n = 18)</th>
<th>Lavene Statistic</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td>0.000</td>
<td>0.982</td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
<td>0.000</td>
<td>0.982</td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td>0.052</td>
<td>0.820</td>
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<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>0.001</td>
<td>0.972</td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>0.792</td>
<td>0.375</td>
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</table>
Table 13

ANOVA of all Experimental vs. all Control Subjects

<table>
<thead>
<tr>
<th>Variable (n = 166)</th>
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<th>MS</th>
<th>F(1, 164)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>0.002</td>
<td>0.002</td>
<td>0.043</td>
<td>0.836</td>
</tr>
<tr>
<td>Within</td>
<td>6.096</td>
<td>0.037</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>3.981</td>
<td>3.981</td>
<td>0.043</td>
<td>0.836</td>
</tr>
<tr>
<td>Within</td>
<td>15,239.4</td>
<td>92.923</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>8.393</td>
<td>8.393</td>
<td>0.064</td>
<td>0.800</td>
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<td>Within</td>
<td>21,443.4</td>
<td>130.752</td>
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<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>4.958</td>
<td>4.958</td>
<td>0.054</td>
<td>0.817</td>
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<td>Within</td>
<td>15,135.8</td>
<td>92.291</td>
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<td></td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>0.000</td>
<td>0.000</td>
<td>0.033</td>
<td>0.856</td>
</tr>
<tr>
<td>Within</td>
<td>2.116</td>
<td>0.013</td>
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<td></td>
</tr>
</tbody>
</table>

Perceived Cohesion Scale (n = 124)

While only originally intending to collect cohesion data for the first 20 subjects (i.e. the pilot) it was determined that a larger PCS sampling was needed in order to achieve statistical power. Therefore, after 40 participants (20 Experimental and 20 Control) completed the alphabetization protocol without the PCS this researcher ultimately decided to collect PCS data for the remaining 140 subjects. After removing those who didn’t follow the directions, there were 124 usable cohesion surveys.

However, even with the larger sample size, the results were not significant largely driven by the large variances within the sample data.
Interestingly, these results differed from the pilot sample. On the “Sense of Belonging” category (SOB+MOC+POC), which is composed of responses to statements of “I feel a sense of belonging to my team” (SOB), “I feel that I am a member of Amazon Mechanical Turk community” (MOC), “I see myself as a part of the Amazon Mechanical Turk community” (POC), experimental subjects scored cumulatively 4.21% worse in the category on average than control participants with scored responses cumulatively averaging 19.48 of 30 among experimental participants vs. 20.34 of 30 among control participants (F(1, 122) = .53, p > .05). Within the three statements comprising the “Sense of Belonging” category (SOB+MOC+POC) the “I feel a sense of belonging to my team.” (SOB) statement itself saw experimental pilot participants underperforming by 7.59% with an average 4.61 of 10 vs. 4.99 among control participants (F(1, 122) = .45, p > .05). In the "I feel that I am a member of the Amazon Mechanical Turk community” (MOC) statement experimental pilot subjects were outscored by pilot subjects by 2.39% with averages of 7.46 of 10 vs. 7.65 among control participants (F(1, 122) = .20, p > .05). In the "I see myself as a part of the Amazon Mechanical Turk community" (POC) statement, experimental subjects were outscored by controls, by 3.95%, with an average statement score of 7.40 of 10 vs. 7.71 of 10 among control participants (F(1, 122) = .53, p > .05).

While also not statistically significant, in the “Feelings of Morale” category (EAW+H2B+OOB) which is composed of responses to statements of “I am enthusiastic about working online” (EAW), “I am happy to be at Amazon Mechanical Turk (H2B), and “Amazon Mechanical Turk is one of the best working communities in the world” (OOB), experimental subjects outperformed controls and did so by 2.26% with an average cumulative score of 22.82 of 30 vs. 22.32 of 30 among control participants (F(1,
In the “I am enthusiastic about working online” (EAW) statement experimental subjects outperformed control participants by 2.26% with average scores of 7.86 of 10 vs. 7.68 of 10 among control participants (F(1, 122) = .21, p > .05). In the “I am happy to be at Amazon Mechanical Turk” (H2B) statement experimental subjects outperformed control subjects by 3.01% with average scores of 8.20 of 10 vs. 7.96 of 10 among control participants (F(1, 122) = .49, p > .05). In the “Amazon Mechanical Turk is one of the best working communities in the world” (OOB) statement experimental subjects outperformed control subjects by 1.37% with average scores of 6.77 of 10 vs. 6.68 among control participants (F(1, 122) = .04, p > .05). The potential reasons behind these outcomes will be discussed in detail in the discussion section to follow.

In conclusion, despite lacking statistical significance, these data in sum bring forth directional affirmation of some hypothesized dimensions and raise some questions for future research.
Table 14

**Descriptive Statistics of Experimental with PCS**

<table>
<thead>
<tr>
<th>Variable (n = 56)</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td>0.88</td>
<td>10.0%</td>
<td>98.0%</td>
<td>33.8%</td>
<td>0.21</td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
<td>44.00</td>
<td>5.00</td>
<td>49.00</td>
<td>16.89</td>
<td>10.26</td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td>44.00</td>
<td>6.00</td>
<td>50.00</td>
<td>20.14</td>
<td>12.17</td>
</tr>
<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>44.00</td>
<td>5.00</td>
<td>49.00</td>
<td>16.92</td>
<td>10.27</td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>0.33</td>
<td>67.0%</td>
<td>100.0%</td>
<td>84.2%</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>PCS Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
<td>10.00</td>
<td>0.00</td>
<td>10</td>
<td>4.61</td>
<td>2.85</td>
</tr>
<tr>
<td>Feeling as a Member Of AMT Community (MOC)</td>
<td>10.00</td>
<td>0.00</td>
<td>10</td>
<td>7.46</td>
<td>2.26</td>
</tr>
<tr>
<td>See Self as Part Of AMT Community (POC)</td>
<td>10.00</td>
<td>0.00</td>
<td>10</td>
<td>7.41</td>
<td>2.24</td>
</tr>
<tr>
<td>Sense Of Belonging Category (SOB+MOC+POC)</td>
<td>30.00</td>
<td>0.00</td>
<td>30</td>
<td>19.48</td>
<td>6.51</td>
</tr>
<tr>
<td>Enthusiastic About Working (EAW)</td>
<td>7.00</td>
<td>3.00</td>
<td>10</td>
<td>7.86</td>
<td>1.93</td>
</tr>
<tr>
<td>Happy To Be on the Team (H2B)</td>
<td>7.00</td>
<td>3.00</td>
<td>10</td>
<td>8.20</td>
<td>1.79</td>
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<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
<td>8.00</td>
<td>2.00</td>
<td>10</td>
<td>6.77</td>
<td>2.47</td>
</tr>
<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
<td>19.00</td>
<td>11.00</td>
<td>30</td>
<td>22.82</td>
<td>5.62</td>
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</tbody>
</table>

Table 15

**Descriptive Statistics of Control Subjects with PCS**

<table>
<thead>
<tr>
<th>Variable (n = 68)</th>
<th>Range</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Dev.</th>
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<td><strong>Performance Data</strong></td>
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<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td>0.74</td>
<td>6.0%</td>
<td>80.0%</td>
<td>33.1%</td>
<td>0.19</td>
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<tr>
<td>Number of Correct Answers (of 50)</td>
<td>37.00</td>
<td>3.00</td>
<td>40.00</td>
<td>15.64</td>
<td>9.65</td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
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<td>4.00</td>
<td>50.00</td>
<td>19.29</td>
<td>11.06</td>
</tr>
<tr>
<td>Number of Attempted Groups Correct (of 50)</td>
<td>37.00</td>
<td>3.00</td>
<td>40.00</td>
<td>16.47</td>
<td>9.62</td>
</tr>
<tr>
<td>Percent of Group Attempts Correct</td>
<td>0.41</td>
<td>59.0%</td>
<td>100.0%</td>
<td>84.8%</td>
<td>0.12</td>
</tr>
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<td><strong>PCS Data</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
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<td>0.00</td>
<td>10</td>
<td>4.99</td>
<td>3.32</td>
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<tr>
<td>Feeling as a Member Of AMT Community (MOC)</td>
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<td>10</td>
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<td>10</td>
<td>7.71</td>
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<td>0.00</td>
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<td>20.34</td>
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<td>Enthusiastic About Working (EAW)</td>
<td>8.00</td>
<td>2.00</td>
<td>10</td>
<td>7.68</td>
<td>2.23</td>
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<td>Happy To Be on the Team (H2B)</td>
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<td>10</td>
<td>7.96</td>
<td>1.99</td>
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<td>Perceive Working Community as One Of the Best (OOB)</td>
<td>9.00</td>
<td>1.00</td>
<td>10</td>
<td>6.68</td>
<td>2.52</td>
</tr>
<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
<td>24.00</td>
<td>6.00</td>
<td>30</td>
<td>22.32</td>
<td>6.26</td>
</tr>
</tbody>
</table>
Table 16

Tests of Homogeneity of Variances of Experimental with PCS vs. Control Subjects with PCS

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<thead>
<tr>
<th>Variable (n = 18)</th>
<th>Laven Statistic</th>
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<td><strong>Performance Data</strong></td>
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<tr>
<td>Percent of Correct Answers</td>
<td>0.189</td>
<td>0.664</td>
</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
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<td>0.664</td>
</tr>
<tr>
<td>Number of Groups Attempted (of 50)</td>
<td>0.514</td>
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<td>Number of Attempted Groups Correct (of 50)</td>
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<tr>
<td>Percent of Group Attempts Correct</td>
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</tr>
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<td><strong>PCS Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
<td>2.766</td>
<td>0.099</td>
</tr>
<tr>
<td>Feeling as a Member Of AMT Community (MOC)</td>
<td>0.069</td>
<td>0.793</td>
</tr>
<tr>
<td>See Self as Part Of AMT Community (POC)</td>
<td>0.094</td>
<td>0.760</td>
</tr>
<tr>
<td>Sense Of Belonging Category (SOB+MOC+POC)</td>
<td>0.064</td>
<td>0.801</td>
</tr>
<tr>
<td>Enthusiastic About Working (EAW)</td>
<td>0.384</td>
<td>0.537</td>
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<tr>
<td>Happy To Be on the Team (H2B)</td>
<td>1.744</td>
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</tr>
<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
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<td>0.945</td>
</tr>
<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
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Table 17

**ANOVA of Experimental with PCS vs. Control Subjects with PCS**

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<th>Variable (n = 124)</th>
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<th>F(1, 122)</th>
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<td></td>
</tr>
<tr>
<td>Percent of Correct Answers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>0.001</td>
<td>0.001</td>
<td>0.038</td>
<td>0.846</td>
</tr>
<tr>
<td>Within</td>
<td>4.81</td>
<td>0.039</td>
<td></td>
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</tr>
<tr>
<td>Number of Correct Answers (of 50)</td>
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<tr>
<td>Between</td>
<td>3.735</td>
<td>3.735</td>
<td>0.038</td>
<td>0.846</td>
</tr>
<tr>
<td>Within</td>
<td>12024</td>
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<tr>
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<td></td>
<td></td>
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<td>22.122</td>
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<td>Within</td>
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<td>Number of Attempted Groups Correct (of 50)</td>
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<td></td>
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<tr>
<td>Within</td>
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<tr>
<td>Percent of Group Attempts Correct</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>0.001</td>
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<td>Within</td>
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<td><strong>PCS Data</strong></td>
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<td></td>
</tr>
<tr>
<td>Sense Of Belonging to My Team (SOB)</td>
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<td></td>
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<td>Between</td>
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<td>4.391</td>
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<td>Feeling as a Member Of AMT Community (MOC)</td>
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</tr>
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<td>1.026</td>
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<td>Within</td>
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<td>See Self as Part Of AMT Community (POC)</td>
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</tr>
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<td>2.676</td>
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<tr>
<td>Within</td>
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</tr>
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<td>Between</td>
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<td>Enthusiastic About Working (EAW)</td>
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</tr>
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<td>Between</td>
<td>0.923</td>
<td>0.923</td>
<td>0.209</td>
<td>0.649</td>
</tr>
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<td>Within</td>
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<td>4.421</td>
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<tr>
<td>Happy To Be on the Team (H2B)</td>
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<td></td>
</tr>
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<td>1.777</td>
<td>1.777</td>
<td>0.491</td>
<td>0.485</td>
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<tr>
<td>Within</td>
<td>441.71</td>
<td>3.621</td>
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<tr>
<td>Perceive Working Community as One Of the Best (OOB)</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>0.256</td>
<td>0.256</td>
<td>0.041</td>
<td>0.84</td>
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<tr>
<td>Within</td>
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<tr>
<td>Feelings Of Morale Category (EAW+H2B+OOB)</td>
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<td></td>
<td></td>
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<td>7.84</td>
<td>0.219</td>
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<td>Within</td>
<td>4368.7</td>
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</table>
Chapter IV
Discussion

Over 100 years of research have shown that social loafing is a real and material psychological phenomenon that reduces performance among humans in groups. It is known that increasing evaluation potential, decreasing deindividuation, and cohesion all lead to reduced social loafing in physical environments. What has not yet been well researched is whether or not the findings associated with many of these variables also apply to virtualized working environments. The intention of this study was to examine impacts to social loafing by modifying the aforementioned variables in the context of a virtual work environment and thereby begin to shine a light into how applicable the extensive body of research about social loafing in physical environments might translate into virtual ones.

Hypothesis, Brief Supportive Argument Overview, & Results in Context

The original hypothesis of this study was: Does self-disclosure lead to improved performance in virtualized teams? History has shown that when humans work together in groups, social loafing occurs (Karau & Williams, 1993). Social Loafing “is the reduction in motivation and effort when individuals work collectively compared with when they work individually or coactively” (Karau & Williams, 1993, page 681).

The performance losses that come as a result of this social loafing are large and costly (Chidambaram & Tung, 2005). People are expected to work in groups in diverse
settings including academic, government, and business environments (Chidambaram & Tung, 2005). Collaborative work will continue to be essential in these environments and others.

Computing technology over the past generation has expanded rapidly and with this expansion has come increased use of “virtualized collaborative environments” (Suleiman & Watson, 2008; Chidambaram & Tung, 2005) which are “an aggregation of individuals or business partners who interact around a shared interest, where the interaction is at least supported and/or mediated by technology and guided by some protocols or norms” (Sun et al., 2012, page 13). Computing technology resulted in new mediums of collaborative exchange and began a burgeoning migration to virtualized settings from physical ones (Suleiman & Watson, 2008) for both social and professional collaboration. 10% of US citizens work from home at least one day a week (Bloom et al., 2013). Virtual collaboration saves money and offers both companies and workers flexibility and as the technology improves so does the quality and frequency of its usage (Sin, 2011). As technology improves, competitive pressures will continue to drive work into formats that include virtual collaboration.

While there are over 100 studies on social loafing in co-located groups (Karau & Williams, 1993; Suleiman & Watson, 2008) little data regarding social loafing in virtualized environments have been published (Suleiman & Watson, 2008); “researchers have neglected examination into the influence of technology on social loafing” (page 292). However, the existing research suggests that social loafing also occurs in virtual groups (Suleiman & Watson, 2008).
One variable that reduces social loafing in co-located groups is evaluation potential (Karau & Williams, 1993; Suleiman & Watson, 2008) sometimes referred to as increased individual identifiability (Miller, 2002; Hardy & Crace, 1991; Chidambaram & Tung, 2005) or reduced deindividuation (Chidambaram & Tung, 2005).

Revealing personal details in co-located groups leads to greater perceptions of cohesion (Stokes, Fuehrer, & Childs, 1983). An example of this can be seen in online-dating research which has shown that the more information online daters disclose the more they trust one another (Lo, Hsieh, & Chiu, 2013). If more virtual self-disclosure leads to increased trust with potential dates, it would seem possible that self-disclosure may also increase cohesion in virtual groups.

Most importantly, group cohesion is associated with lower levels of social loafing (Karau & Williams, 1993; Suleiman & Watson, 2008; Evans & Dion, 2012) and the presence of weak social ties has been shown to increase social loafing (Shiue, Chiu, & Chang, 2010). Reduced loafing predicts greater performance. Self-disclosure should lead to reduced deindividuation and increased evaluation potential, resulting in decreased social loafing and greater performance. Therefore it was thought that self-disclosure may be beneficial in a virtual work environment as it’s also been suggested that teams are rarely given the opportunity to build cohesion (Karau & Williams, 1993).

Therefore it was expected (just as self-disclosure increases evaluation potential in co-located groups and increases trust in online dating, etc.), that in having subjects engage in self-disclosure there would be a reduction in the deindividuation, increased perceived evaluation potential, and increased feelings of cohesion, all of which have been shown to decrease social loafing. This reduction in social loafing was to be evinced
through improvements in experimental subjects’ performances relative to those of controls.

While not statistically significant, from a performance perspective (and therefore a social loafing perspective) the data supported this hypothesis as being directionally correct. Experimental subjects outperformed controls by 1.9% (averaging 16.64 vs. 16.33 correct responses among control participants) \( (F(1, 164) = .04, p > .05) \). As people felt more identifiable through self-disclosure, they likely felt increases in evaluation potential and reductions and deindividuation as predicted, and therefore worked harder as a result thereby increasing the number of answers rendered.

Furthermore, despite not achieving statistical significance, experimental subjects were also more accurate in their responses by 0.38% \( (F(1, 164) = .03, p > .05) \). While this finding wasn’t part of the original set of expectations it is consistent with the spirit of the hypothesis and provides further strength to the argument’s theme. It is reasonable to assume that as people felt they were more identifiable and therefore worked harder on a given task that they would also strive to better understand the instructions and nuances of the specific requirements. The design of this alphabetization task was deliberately structured to add the challenge of making the alphabetization process about ordering the first letter of each of the three-word company names as opposed to traditional alphabetization which would have dictated the order would be relative to the arrangement of the letters starting from the left (in the first word and so on).

Also consistent with the hypothesis was the fact that experimental participants outscored controls on the entire “Feelings of Morale” category \( (EAW+H2B+OOB) \) of the Perceived Cohesion Scale (albeit, again, not statistically significantly) by 2.26% with an
average cumulative score of 22.82 of 30 vs. 22.32 of 30 among control PCS participants (F(1, 122) = .22, p > .05). Within this category this researcher observed experimental participants outscore control participants in each of the three statements around their enthusiasm for their working medium (depicted via the “I am enthusiastic about working online” (EAW) statement where experimental PCS subjects outperformed control PCS participants by 2.26% with average scores of 7.86 of 10 vs. 7.68 of 10 among pilot control participants (F(1, 122) = .21, p > .05)), in their happiness (depicted through the “I am happy to be at Amazon Mechanical Turk” (H2B) statement where experimental PCS subjects outperformed control PCS subjects by 3.01% with average scores of 8.20 of 10 vs. 7.96 of 10 among control PCS participants (F(1, 122) = .49, p > .05)) and in the statement where they identified their place of work as being “one of the best” (as was represented by the “Amazon Mechanical Turk is one of the best working communities in the world” (OOB) statement where the experimental PCS subjects outscored control PCS subjects by 1.37% with average scores of 6.77 of 10 vs. 6.68 among control PCS participants (F(1, 122) = .04, p > .05)). These findings make intuitive sense as people who are afforded the ability to introduce themselves to their teammates likely feel more welcomed by their working environment than those who are merely notified that they are on a team.

Recall that in the pilot some of this “Feelings of Morale” section of the PCS statements had a couple instances of heteroskedasticity in having failed Lavene’s test and that, when tested for equality of means to accommodate said heteroskedastic data that “I am happy to be at Amazon Mechanical Turk” (H2B) approached the statistical significance threshold of alpha = .05 (p = .08). While ultimately “I am happy to be at
Amazon Mechanical Turk” (H2B) in the larger sample didn’t achieve statistical significance (or have heteroskedastic issues) there may be some individuals for whom increased evaluation potential reduces their ability to perform and therefore may result in greater variance at one end of the spectrum. For example, there were three instances in which an individual participant attempted more than one posted task despite the instructions and in two of those instances the individuals did the experimental condition task after the control condition task and yet they performed worse on the experimental condition task.

In both instances the subjects’ performance was worse (8 correct vs. 10 correct, i.e., down 20% and 11 correct vs. 18 correct, i.e., down 38.8%) on the experimental task (i.e., having experience with the task and being primed to more rapidly go through the task with the exact same groupings). There may have been re-orientation costs (i.e., lack of focus, increased anxiety, or that the time required to complete them exceeded the incremental time allotted for them) associated with completing the self-disclosure statement in the experimental condition. This suggests that the difference in performance may be even greater if researchers were able to control for those factors.

An unexpected outcome arose in the “Sense of Belonging” category of the Perceived Cohesion Scale. Experimental participants scored worse than controls by 4.21% with scored responses cumulatively averaging 19.48 of 30 among experimental pilot participants vs. 20.34 of 30 among control PCS participants (F(1, 122) = .53, p > .05). Recall from the results section that this was comprised of responses to statements of “I feel a sense of belonging to my team” (SOB), “I feel that I am a member of Amazon Mechanical Turk community” (MOC), “I see myself as a part of the Amazon Mechanical
Turk community” (POC), which were worse among experimental subjects by 7.59% (F(1, 122) = .45, p > .05), 2.39% (F(1, 122) = .20, p > .05), and 3.95% (F(1, 122) = .53, p > .05) respectively.

It was assumed increasing self-disclosure would be successful in increasing performance through reduced social loafing because it was expected that by reading biographies of teammates and writing one of their own for their teammates to read that the subject would feel a heightened bond in the form of heightened cohesion to their teammates relative to controls who simply knew they were on a team. In practice, however, several different variables could explain this result. First, these teams were incredibly transient. Participants knew they were only going to be working on this one task together (and for just 20 minutes) so there may have been little perceived value to formulating cohesion. In fact, it may have come across as being strange, maybe even off-putting, to be introduced to teammates that they would never work with again. And perhaps by laying out so boldly the fact that there was no real sense of team or any degree of the permanence that is typically associated with the creation of cohesion among individuals of a team it reduced their perception of a sense of belonging to said team.

Second, and likely, control subjects may not have associated with the “team” they were being assigned to and therefore they interpreted the sense of belonging statements more broadly to AMT as a whole (note that the “Feelings of Morale” category (EAW+H2B+OOB) scores were on average higher than the “Sense of Belonging” category scores in both groups). Thus, the cohesion manipulation may have led experimental vs control participant to interpret “their team” on the PCS differently.
Conclusions & Implications

While it would be unwarranted to draw conclusions (given the lack of statistical significance) from the results of this research, these data do suggest that certain dimensions of the existing social loafing research may translate into a virtual environment.

The lack of statistical significance was largely due to the extreme variability in participants’ performances relative to sample size (n) and differences in sample means. If expanded in scale this experiment may eventually achieve statistical significance but doing so would require an extremely large sample size. Despite the absence of statistical significance this study revealed both the possible implications if these differences held over a larger sample size and what modifications and additional research could be undertaken to better understand how to reduce social loafing in virtualized teams to increase their performance.

In practice it may be that adding simple elements of humanity into virtual environments (both work and academic), such as moments of self-disclosure, may result in the addition of material value over time if only as far as increasing participants’ feelings of morale (which will likely decrease attrition) and reducing social loafing (which will increase performance).

Although a 1.9% increase in performance with 0.38% greater accuracy may seem minute, small differences matter, particularly over time and scale. It is often cited that there are incredibly small differences between the deoxyribonucleic acid sequences composing chimp and human DNA and yet these minute differences have extreme
impacts on outcome. Furthermore, one need not watch any competitive endeavor long to realize how small the differences are in performance among elite athletes, etc. Similarly “small” differences make the difference between winning and losing in hypercompetitive environments like business and academia. Small differences matter and it is reasonable to think that if this research were carried out over a sample size of tens of thousands that this aforementioned hypothesis (that something as simple and costless as encouraging self-disclosure in virtual teams changes performance outcomes) could eventually achieve statistical significance.

Lastly, finding any difference at all, in the expected direction, is within itself notable given how tiny the actual cohesion-inducing manipulation was (i.e., a self-statement of only a few lines) and how incredibly short-term the perceived association with their teammates was (i.e., less than half an hour).

New Questions Raised & Future Research Opportunities

These findings raise a myriad of questions. For instance, to what degree were the differences in performance limited by how transient team membership was? It is known that cohesion exists on a curve (teams that are too cohesive actually perform worse than those that are only moderately cohesive (Evans & Dion, 2012)) so are these findings representative of the most extreme left tail of that cohesion curve? If so, could one expect to see larger performance gains with more stable teams?

And at what point does self-disclosure trump the transient nature of a team? If this researcher were to have asked participants to give increasingly personal information would it have reached a point where the heightened intimacy outweighs the short-lived
duration of the team? This researcher’s impression is yes, and one could imagine this is consistent up the team-life duration spectrum (so that as a participant traverses the cohesion bell curve, along the duration spectrum, the performance of the individual at each stop along the cohesion bell is influenced by the degree of intimacy shared at that point). This would be fascinating to test and is ripe with opportunities for statistical analysis.

And at what point does a team spend enough time interacting to stop being considered transient? Does whether or not a team is transient depend upon the type of team and/or task at hand? Standardized definitions will become increasingly important as this field continues to expand.

Does cohesion itself take on a different form among team members in virtualized environments? As companies and schools continue to migrate to online environments do researchers need to start thinking differently about what cohesion is in practice? Is it possible for individuals who have never met or have only met once to ever develop the level of cohesion that people who have worked side-by-side for lengthy periods of time do? What is the difference in rate of development of that cohesion?

The same question ought to be asked about self-disclosure, deindividuation, and their respective impacts on participants. Does self-disclosure matter when a participant knows he or she will never meet this teammate in person? It likely does in instances where grades and paycheck vulnerability are concerned but even then it would be interesting to see if performance varies at the same level of self-disclosure to a given audience relative to medium of exchange.
Another intriguing alternative version of this paper’s experiment would be to have participants meet their "team" across an experiential gradient. In the baseline you have them "meet" in the same way the experimental participants in the present study did (in writing), then in the next level of experiment you have them instant message with each other, then in another tier have participants exchange video introductions, then another tier with live video interaction, and then a final experimental level where researchers could have a group of actors that all participants meet in person and return to their virtual environments to complete the task. The researcher could then map the gradient and see the degree to which performance was enhanced through reduced social loafing across the spectrum.

Another dimension worthy of consideration is the task itself. Perhaps this alphabetization task was within itself too impersonal to allow any real cohesion to occur. Those few attempts that have taken place around the subject of social loafing in virtual environments leveraged far more complex tasks like Electronic Brainstorming (EBS) software (Chidambaram & Tung, 2005) and the General Management In-Basket Task (GMIB) (Suleiman & Watson, 2008) as their tasks, which are much more interactive and cerebral. Future research may show that the more complex the task, the greater the impact to reduction of social loafing as the importance of team, the likelihood of cohesion, the opportunities for evaluation by peers, etc., rise.

The research opportunities in this field are numerous because so little has been done regarding social loafing in virtual environments despite its magnitude on today’s businesses, governments, and schools.
Research Limitations

As with all research there are some noteworthy things to consider when applying learnings from the research contained herein.

First, while the directionality of the findings was relatively consistent throughout the course of the data collection, none of the findings achieved statistical significance at the preselected alpha of .05.

Second, the virtualized component of this research was ideal in maximizing accessibility, generalizability, and cost effectiveness. However it’s possible during self-disclosure participants may have lied. Deception is a frequent dimension of human interaction and is particularly present in online settings given the complete absence of nonverbal cues (Lo et al., 2013). This might have limited increases that otherwise would have occurred in cohesion and evaluation potential, as well as any decreases in deindividuation. However, the AMT program requires standardized profiles which hopefully minimized this risk.

Third, while all sets of instructions clearly stated only 20 minutes were to be allotted to complete the task, in theory some participants may take longer. For instance, some participants in the pilot tasks (both Control and Experimental) may have erroneously taken more than the specified time by leveraging time that was to be allotted to filling out the PCS, etc. AMT measures the total time utilized by a participant during the completion of their task but in instances where the task also includes filling out the PCS the ability to determine where the time was used becomes obfuscated. Differences in mean times however suggested this likely wasn’t a systemic problem but it may have
impacted a small handful and in a sample population with such wide performance variance that can influence outcomes.

Fourth, results from this study also likely cannot be generalized to other types of tasks. There are many types of tasks that teams in the real world complete and this experiment only leverages a relatively simple alphabetization task. As discussed in the above section, it may eventually be found that the more complex the task the greater the impact to reduction of social loafing.

Fifth, the social pressures typically associated with identifiability in co-located groups may have less effect with virtual groups given their disparate and transient structure: “the use of groups without any prior or expected future work history can contribute to a lack of motivation since there are no potential threats of retaliation in the future for poor performance” (Suleiman & Watson, 2008, page 307). We also know from social psychology research that relationships are often just as much about proximity as similarity (Preciado, Snijders, Burk, Stattin, & Kerr, 2012) and thus some participants may have been indifferent to having other people be aware of who they are as they will likely never work with these people again. One potential solution suggested by Suleiman and colleagues is leveraging standing project teams, however this would likely create more research problems than it would resolve as researchers would have to quantify and take into account the various pre-existing differences in cohesion and abilities of participants who, by definition of being a member of a standing team, would not have been randomly selected.

Lastly, research on working adults detects lower rates of social loafing than research using students (Karau & Williams, 1993) and Master’s thesis and dissertation
work tends to result in findings of lower rates of loafing than research conducted for journal inclusion (Karau & Williams, 1993) as social loafing rates may be too low in either group to detect measurable differences. Thus, as was suggested might be the case in the proposal, this experiment’s results ended up aligned with other social loafing research in that it found differences but they were ultimately not large enough to achieve statistical significance.

Nonetheless, despite these limitations this study aimed to provide a crucial first step towards addressing productivity concerns often perceived as being associated with virtual groups, and ultimately, these findings may speak to the challenges to be faced by a humanity subsumed within an increasingly virtualized and transient world.
APPENDICES

Appendix A

IRB Approval
Appendix B

Amazon Mechanical Turk HIT Description for Control Pilot/PCS

DESCRIBE YOUR HIT TO WORKERS:

Title: Writing & Categorization/Alphabetization

Description: Please alphabetize as many of the following groups as you can in 20 minutes. No Automation Allowed.

Keywords: Writing, Categorization, Alphabetization

SETTING UP YOUR HIT:

Reward Per Assignment: $2.50

Number of Assignments Per HIT: 1

Time Allotted Per Assignment: 25 Minutes

HIT Expires In: 1 Day

Auto-Approve and Pay Workers In: 24 Hours

DESIGN LAYOUT:

You’re the final member of a five-person team engaged in this type of task The work you do, while tied to you, will be combined with theirs in the final product and any remaining groupings you don’t get to in the time allotted will be finished off by one of them.

Alphabetize of as many of the following group lists as you can within 20 minutes. Set a timer, it is vital that you do not exceed 20 minutes on the activity itself (it's okay if you don't get all the way through the lists just mark with an asterisk (*) where you stop). Absolutely no automation (formulas, macros, VBA, etc.) allowed.

After you’ve completed your 20 minute attempt at the task please then take the remainder of the time to complete a very quick five-question survey attached at the end.

Example
Vic's Automation Shops
Ashland Express Systems
Quantrix Hughes Anixter
The Paper Arrow
Estwing Roper Resources

Should be alphabetized (using the first letter of each word) as:

Ashland Express Systems (AES)
Estwing Roper Resources (ERR)
Quantrix Hughes Anixter (QHA)
The Paper Arrow (TRA)
Vic's Automation Shops (VAS)

Group 1

Chesapeake Marine Technologies
National Aircraft Holdings
Visteon Lansing Collins
Altra Crown Corporation
International Lennox Group

Group 2

Loom Farms Insurance
Callaway Industries Company
Las Audio Company
Communications Products Union
Firestone Celgene Silicon

Group 3

Lifesciences Network Corporation
Schlumberger Oaktree Aluminum
Intersil Bemis Group
DC Entertainment Corporation
Interpublic Products Automation

Group 4

LabCorp Bushmaster Company
Comic Markets Company
Six Lee Inc.
BorgWarner Regal Systems
Foot Resources Industries

Group 5

Intercontinental Marketing Group
Delta Energy Intelligence
Rockford Global Technologies
Paychex Land Systems
Burpee World Entertainment

Group 6

Robert Callender's Pizza
Union Company Manufacturing
Networks' Lifesciences Brands

CSX Netcordia Corporation

Meyer Carlson Company

**Group 7**

Luby's Supermarkets Bank

Brookdale Flowers Company

Warburg Depot Services

Salem Waters Associates

Wahl Specialized Cooperative

**Group 8**

Bell Corporation Systems

Denbury Controls Solutions

Honeywell McGee Group

Vic's Automation Products

Paramount Steel Inc

**Group 9**

Altera Bose Management

Associated Bronco Industries

Ideal Ruby Corporation

Sunoco Momentive Monitors

Lee Inc. Network

**Group 10**
Sun Group Electronics
Morgan Forest Corporation
Emerson Fruit Inc.
Western Arrow Inc.
Alexion Gulfstream Systems

Group 11
Russell Worldwide Corporation
The Motion Beam
Taylor Lincoln International
Regis Technology Inc.
Bollinger Bass Company

Group 12
Hilton Intertechnology Centers
Whitney Genuine Networks
Meyer Carlson Mutual
Kaiser Omni Oshkosh
Vantec Services Corporation

Group 13
Leviton Pinnacle Industries
Bose Management Holdings
Oil Wizards Company
Gibson Group Company
Martin Zions Resources

**Group 14**

Blackstone Ashland Express
Hughes Anixter Steelcase
Gordon Corporation Inc.
Aerospace Textron Schwan
Intuitive Mead Financial

**Group 15**

Union Communications Company
Micro Corp. Airlines
Vivitar Progressive Railway
Belk International Software
Boise Mesa International

**Group 16**

Maritime Kaiser Omni
American Pioneer Parts
Sur United Resources
Sears Works Corporation
Wahl Industries Brands

**Group 17**

Danaher Strayer Corporation
Seagate Dart Imation
Alaskan Exchange Industries
Bauer Technology Corporation
Cecillia Pinnacle Petroleum

**Group 18**

Pep Infinity Railcorp
Ralph Torry Machines
Callender's Pizza Solutions
Liberty Inc. Media
Collins Murphy Ariba

**Group 19**

Roush AnaSpec Corporation
Mohawk Syntel Pharmaceuticals
Grill Hughes Corporation
Cima Aircraft Corporation
Ethan Affiliated Inc.

**Group 20**

Mission Steel Partners
Burton Communications Corporation
Zenith Steel Partners
American Arts Worldwide
Vulcan Papa Corporation

**Group 21**
Columbia Pacific Railroad
International Riceland Company
Apogee Fragrances Company
Johnson Wakefern Air
Russell American Parts

Group 22

LabCorp Venus Company
CHS XIM America
Speedway International Inc.
Roush AnaSpec Inc.
International Seeds Corporation

Group 23

Eastman Company Sons
Inc. Company Media
Helicopter Perdue Corporation
Dick's Arryx Corporation
Watkins Owens Company

Group 24

Flags Corporation Graham
Arms Axle Group
California Farms LLC
New Western Biggby
Syntel Pharmaceuticals Company

**Group 25**

Kimber Freeze Towers

Systems FileMaker Company

Koch Steel Corporation

Aircraft PSSC Inc.

Columbia Lennar Group

**Group 26**

Ethan Inc. Industries

Time Meritor Corporation

Mesa International Homes

Gordon Mitchel Steel

Hot Bank Arts

**Group 27**

Marathon World News

Alcoa Energy Group

Abbott Applied Sciences

Herman Global Co.

Ralph Arms Axle

**Group 28**

Dart Imation Whitney

Meijer Technology Company
Mead Financial Bank
Dana Molex, Albemarle
Benihana Seagate Company

Group 29

Burton Emerson Communications
Protective Solutions Inc.
Oshkosh Fenway Aerospace
Netc.ordia Erickson Corporation
Hobbico, Birdwell, Church

Group 30

Global Technologies Group
Gardner Corporation International
Works Corporation Networks
Bemis Bushmaster Organization
Western Grill Restaurants

Group 31

Murphy Ariba Company
Bealls Weis Systems
Marlin Fluor Corporation
Networks Quantrix Hughes
Mars Technologies Group

Group 32
DaVita Systems Industries
Crown Financial Corporation
AnaSpec Fruit Inc.
Arms Liberty Inc.
Boyer Denbury Controls

**Group 33**

Celgene Silicon Products
Avon Mills Holdings
Ben Brands Corporation
Caremark Alliant Express
Sierra Farms Entertainment

**Group 34**

Meyer Paper Company
Bain DaVita Systems
American Flag Corporation
Bebo Ross Corporation
Company Sur United

**Group 35**

Peso Brothers Inc.
Media Brands Company
Cognizant Analytics Corporation
Rockstar Holdings Corporation
Liberty Petroleum Company

**Group 36**

Pioneer Interactive International

Altria Technology Corporation

Ground Midland Corp.

Maxim Companies Associated

Metro Air Electronica

**Group 37**

Bradley Foods Products

Johnson Eli Leonard's

Paramount Inc. Airways

Cbeyond Visteon Lansing

Seattle's Coffee Zoo

**Group 38**

Church Speedway International

Bell Sturm, Affiliated

Ball Soda Factory

Edison International Airlines

Zenith Markets Foods

**Group 39**

Panda Pinnacle Insurance

Jackson Paper Company
AMC Marlin Company

Western Taser Company

International Studios Corporation

**Group 40**

Pizza Solutions L&L
Liberty Loral Holdings
Aspyr International Aerospace
Radio Marathon Association
Amway Uniphase Semiconductors

**Group 41**

World Regions Corporation
Infinity Railcorp Companies
General Crane Corporation
Regis Technology Machines
Aspyr Life Sciences

**Group 42**

Legg Hyland Company
Lifesciences Brands Company
Carnival Manufacturing Company
Russell Marsh Inc.
Paper Arrow Templeton

**Group 43**

68
McIlhenny Maidenform Arms
Tree Vertex Inc.
Lincoln Chemical Enterprises
Cardinal General Inc.
Vertex Inc. Systems

**Group 44**

Electronic Air Communications
Benihana Seagate Dart
Hunt Group Solutions
Biomet Safeway Inc.
XIM America General

**Group 45**

Cerberus Zune Systems
Birdwell Church Speedway
Kramer International Inc.
Biggby Rockford Global
Hut Industries Corporation

**Group 46**

Ariba Company Airlines
Otis Emcor Air
Maxim Corporation Company
Caesars Soyo Inc.
Lansing Collins Murphy

**Group 47**

Hamilton Waters Corporation

GlobalFoundries Games Corporation

Jack Craft Parts

Amy's New Company

Urban Winery Shop

**Group 48**

Drilling Inc. Group

NCR Foods Hillerich

Dean Hughes Corporation

Intersil Shipyards Group

Semiconductor Airways Comics

**Group 49**

Atmel Grumman Partners

Tupperware Columbia Group

Dover Group Homes

Steelcase, Kodak, Watkins

Schnucks Luby's Supermarkets

**Group 50**

Beckman Airways Systems
Laserfiche Integrated Robotics

Standard Caremark Inc.

Regal Avon Mills

Bauer Williams Technology

Thanks for helping us out with this task. Please indicate your feelings on a scale of 0 to 10 (with 0 representing the highest disagreement with the statement and 10 representing the highest agreement with the statement) next to the following statements:

Sense of Belonging
I feel a sense of belonging to my team. _____
I feel that I am a member of the Amazon MechanicalTurk community. _____
I see myself as a part of the Amazon Mechanical Turk community. _____

Feelings of Morale
I am enthusiastic about working online. _____
I am happy to be at Amazon MechanicalTurk. _____
Amazon MechanicalTurk is one of the best working communities in the world. _____

Thanks for your input!

Please note that while this alphabetization task has been posted multiple times, we would ask that you only attempt this task once. Thank you again for your help.
Appendix C

Amazon MechanicalTurk HIT Description for Experimental Pilot/PCS

DESCRIBE YOUR HIT TO WORKERS:

Title: Writing & Categorization/Alphabetization

Description: Please alphabetize as many of the following groups as you can in 20 minutes. No Automation Allowed.

Keywords: Writing, Categorization, Alphabetization

SETTING UP YOUR HIT:

Reward Per Assignment: $3.00

Number of Assignments Per HIT: 1

Time Allotted Per Assignment: 30 Minutes

HIT Expires In: 1 Day

Auto-Approve and Pay Workers In: 24 Hours

DESIGN LAYOUT:

You’re the final member of a five-person team engaged in this type of task. The work you do, while tied to you, will be combined with theirs in the final product and any remaining groupings you don’t get to in the time allotted will be finished off by one of them.

Alphabetize as many of the following group lists as you can within 20 minutes. Set a timer, it is vital that you do not exceed 20 minutes on the activity itself (it's okay if you don't get all the way through the lists just mark with an asterisk (*) where you stop). Absolutely no automation (formulas, macros, VBA, etc.) allowed.

After you’ve completed your 20 minute attempt at the task please then take the remainder of the time to complete a very quick five-question survey attached at the end.

But first, before beginning the 20-minute task activity, please take a moment to share a little about yourself for your teammates to read. Here are what your four teammates
posted, please take a moment to read and familiarize yourself with your team:

*I’m Jack. I’m tall (over 190cm) and live in Sweden, I love football and handball and orienteering.*

*My name is Samantha. I’m a stay-at-home-mom and I live in the US. I love MTK because it allows me to pick up some extra cash on the side. I <3 it!*

*Georrig – Wie gehts. Germany checking in. Plugging away as always.*

*Greetings. I’m Pallavi. While I wrote my MBA in the US I’m based out of Mumbai.*

PLEASE INSERT SELF-STATEMENT (MANDATORY):

Now that you’ve introduced yourself, please alphabetically organize as many of the following three-word company names in as many of the five-phrase groupings as you can in 20 minutes:

[NOTE: Task redacted for preservation of space; see Appendix ## - for complete task list]

Thanks for helping us out with this task. Please indicate your feelings on a scale of 0 to 10 (with 0 representing the highest disagreement with the statement and 10 representing the highest agreement with the statement) next to the following statements:

*Sense of Belonging*
  I feel a sense of belonging to my team. ____
  I feel that I am a member of the Amazon MechanicalTurk community. ____
  I see myself as a part of the Amazon Mechanical Turk community. ____

*Feelings of Morale*
  I am enthusiastic about working online. ____
  I am happy to be at Amazon MechanicalTurk. ____
  Amazon MechanicalTurk is one of the best working communities in the world. ____

Thanks for your input!

Please note that while this alphabetization task has been posted multiple times, we would ask that you only attempt this task once. Thank you again for your help.
Appendix D

Amazon Mechanical Turk HIT Description for Control (non-PCS)

DESCRIBE YOUR HIT TO WORKERS:

**Title:** Writing & Categorization/Alphabetization

**Description:** Please alphabetize as many of the following groups as you can in 20 minutes. No Automation Allowed.

**Keywords:** Writing, Categorization, Alphabetization

SETTING UP YOUR HIT:

**Reward Per Assignment:** $2.00

**Number of Assignments Per HIT:** 1

**Time Allotted Per Assignment:** 20 Minutes

**HIT Expires In:** 1 Day

**Auto-Approve and Pay Workers In:** 24 Hours

DESIGN LAYOUT:

You’re the final member of a five-person team engaged in this type of task. The work you do, while tied to you, will be combined with theirs in the final product and any remaining groupings you don’t get to in the time allotted will be finished off by one of them.

Alphabetize as many of the following group lists as you can within 20 minutes. Set a timer, it is vital that you **do not exceed 20 minutes** on the activity itself (it's okay if you don't get all the way through the lists just mark with an asterisk (*) where you stop). **Absolutely no automation** (formulas, macros, VBA, etc.) allowed.

[NOTE: Task redacted for preservation of space; see Appendix ## - for complete task list]
Thanks for your input!

Please note that while this alphabetization task has been posted multiple times, we would ask that you only attempt this task once. Thank you again for your help.
Appendix E

Amazon Mechanical Turk HIT Description for Experimental (non-PCS)

DESCRIBE YOUR HIT TO WORKERS:

Title: Writing & Categorization/Alphabetization

Description: Please alphabetize as many of the following groups as you can in 20 minutes. No Automation Allowed.

Keywords: Writing, Categorization, Alphabetization

SETTING UP YOUR HIT:

Reward Per Assignment: $2.50

Number of Assignments Per HIT: 1

Time Allotted Per Assignment: 25 Minutes

HIT Expires In: 1 Day

Auto-Approve and Pay Workers In: 24 Hours

DESIGN LAYOUT:

You’re the final member of a five-person team engaged in this type of task. The work you do, while tied to you, will be combined with theirs in the final product and any remaining groupings you don’t get to in the time allotted will be finished off by one of them.

Alphabetize as many of the following group lists as you can within 20 minutes. Set a timer, it's vital that you do not exceed 20 minutes on the activity itself (it's okay if you don't get all the way through the lists just mark with an asterisk (*) where you stop). Absolutely no automation (formulas, macros, VBA, etc.) allowed.

But first, before beginning the 20-minute task activity, please take a moment to share a little about yourself for your teammates to read. Here are what your four teammates posted, please take a moment to read and familiarize yourself with your team:
I'm Jack. I’m tall (over 190cm) and live in Sweden., I love football and handball and orienteering.

My name is Samantha. I’m a stay-at-home-mom and I live in the US. I love MTK because it allows me to pick up some extra cash on the side. I <3 it!

Georrig – Wie gehts. Germany checking in. Plugging away as always.

Greetings. I’m Pallavi. While I wrote my MBA in the US I’m based out of Mumbai.

PLEASE INSERT SELF-STATEMENT (MANDATORY):

Now that you’ve introduced yourself, please alphabetically organize as many of the following three-word company names in as many of the five-phrase groupings as you can in 20 minutes:

[NOTE: Task redacted for preservation of space; see Appendix ## - for complete task list]

Thanks for your input!

Please note that while this alphabetization task has been posted multiple times, we would ask that you only attempt this task once. Thank you again for your help.
Appendix F

Bollen & Hoyle’s Perceived Cohesion Scale (PCS)

In accordance with the originating 1990 work of Kenneth Bollen and Rick Hoyle, I will be using the Perceived Cohesion Scale, which leverages the following six-question, Likert-based (0-10, with 10 representing the highest agreement) questions:

(Excerpted from the original 1990 “Perceived Cohesion: A conceptual and Empirical Examination” work by Bollen and Hoyle; used with permission.)

Sense of Belonging
I feel a sense of belonging to ________.
I feel that I am a member of the _________ community.
I see myself as a part of the ___________ community.

Feelings of Morale
I am enthusiastic about _________.
I am happy to be at [live in] _________.
__________ is one of the best schools [cities] in the nation.

Given Amazon Mechanical Turk is a transactional online work community the questions will be tailored accordingly:

Sense of Belonging
I feel a sense of belonging to ___My Team_____.
I feel that I am a member of the ______Amazon Mechanical Turk____ community.
I see myself as a part of the ___Amazon Mechanical Turk____ community.

Feelings of Morale
I am enthusiastic about ___Working Online _______.
I am happy to be at _____Amazon Mechanical Turk_____.
____Amazon Mechanical Turk___ is one of the best working communities in the world.

It will be delivered in context as follows:

Thanks for helping us out with this task. Please indicate your feelings on a scale of 0 to 10 (with 0 representing the highest disagreement with the statement and 10 representing the highest agreement with the statement) next to the following statements:
Sense of Belonging
I feel a sense of belonging to my team. _____
I feel that I am a member of the Amazon Mechanical Turk community. _____
I see myself as a part of the Amazon Mechanical Turk community. _____

Feelings of Morale
I am enthusiastic about working online. _____
I am happy to be at Amazon Mechanical Turk. _____
Amazon Mechanical Turk is one of the best working communities in the world. _____

Thanks for your input!
Appendix G

Debriefing

Thank you again for choosing to participate in the Alphabetization task.

The task you just completed was a part of a study looking at the performance of individuals working in teams in virtual work environments. It was specifically looking at seeing what variables reduce the psychological phenomenon of “social loafing” (which often results in lower performance of individuals in teams relative to the performance they otherwise would have achieved through their individual contribution).

The hope is that by better understanding how to help people maximize their work potential we can help individuals and the leaders of organizations (academic, governmental, and commercial) differentiate themselves and bring about a better world with the limited time and resources we have.

Your contributions will be completely anonymized, all identifiers (such as your Worker ID) will be cleansed from the data, and the data itself will be deleted upon completion of the study. Given the nature of the study, outcomes likely would have been biased had we let you know this was a study and asked for your consent in advance of your completing the task, so, if (in the light of now knowing this was for purposes of research) you’d like to have your input deleted entirely (ie not used in the study) let me know by sending me an email with your Task ID and we’ll delete the corresponding data before we aggregate and anonymize the data of the participants. Otherwise, thank you for participating and helping us try to make the world a better place.

Matt Hagen
MatthewHagen@FAS.Harvard.Edu
(212) 256 - 1655

And please don’t hesitate to reach out in the event that you have any questions or concerns.

Thanks again.

This research has been reviewed by the Committee on the Use of Human Subjects in Research at Harvard University. They can be reached at 617-496-2847, 1414
Massachusetts Avenue, Second Floor, Cambridge, MA 02138, or cuhs@fas.harvard.edu if your questions, concerns, or complaints are not being answered by the research team, if you cannot reach the research team, if you want to talk to someone besides the research team, or if you have questions about your rights as a research participant.
References


Works Consulted


