

Yin and Yang Theory of Competition:  
Social Comparison and Evaluation Apprehension Reciprocally Drive Competitive Motivation

by

Patricia Chen

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Advisor: Professor Stephen M. Garcia

### Abstract

In a competition, what drives competitive motivation – comparison with others or the anxiety of evaluation? These two mechanisms, namely social comparison and evaluation apprehension, respectively, have previously been independently implicated as primary driving forces behind competition. However, there is a scarcity of literature examining them in concert. This series of studies focuses on studying how the mechanisms of social comparison and evaluation apprehension work hand-in-hand to drive competitive behavior and feelings. The Yin and Yang Theory of Competition is put forth in two parts: firstly, social comparison and evaluation apprehension mechanisms work in concert to drive competitive behavior; secondly, both these processes work in a reciprocally affecting “yin and yang” fashion to fuel competitive motivation.

Keywords: social comparison, evaluation apprehension, competitive, yin and yang

### Yin and Yang Theory of Competition:

#### Social Comparison and Evaluation Apprehension Reciprocally Drive Competitive Motivation

By the very nature of our meritocratic capitalist society, every form of compensation, from salaries to recognition, hinges on outperforming the competition. Whether in athletic sports, classes graded on a curve, or corporate organizations, competitive settings form an ubiquitous part of our daily lives. Two key cognitive experiences within competitive settings include having to compare one's progress to another's (social comparison), and also the anxiety of being under assessment (evaluation apprehension). It can, therefore, prove beneficial to know how these factors contribute to motivating us as competitors. However, previous research has tended to examine these two mechanisms separately, rather than together within the same context. Attempting to bridge what both the social comparison and social facilitation literatures say about competition, this paper offers the novel idea of dual interacting mechanisms driving competitiveness. The Yin and Yang Theory of Competition is put forth in two parts, firstly, social comparison and evaluation apprehension mechanisms work in concert to drive competitive behavior; secondly, both these processes work in a reciprocally affecting "yin and yang" fashion to fuel competitive motivation.

Since the inception of psychological experimentation, researchers such as Norman Triplett have been exploring the topic of social motivation. In the first published social psychology paper, Triplett (1898) observed that bicycle racers had faster timings when racing alongside other cyclists than when racing alone. He reproduced this effect in the laboratory, by demonstrating that children reeled in fishing lines faster when performing alongside another (whom he termed a "coactor"), as compared to when they were reeling on their own (Triplett, 1898). This research formed a platform for a plethora of other studies on motivation in the areas of competition, social comparison, and social facilitation – the phenomenon of altered

performance in the presence of others (Rosenbloom, Shahar, Perlman, Estreich, & Kirzner, 2007).

### **Social Comparison Fuels Competition**

Since Triplett's groundbreaking study, Leon Festinger proposed the concept of social comparison as a driving force behind competitive motivation (Festinger, 1954; Garcia & Tor, 2009; Garcia, Tor, & Gonzalez, 2006; Johnson & Stapel, 2007). According to Festinger (1954), we have an innate drive to evaluate our own opinions and abilities. To assess where we stand in the absence of an objective measurement system, we base our comparisons against others in a competitive setting. These social comparisons throw light on any discrepancies with the target rival, and motivates the individual to behave in a competitive manner, aimed at reducing or eliminating such discrepancies that might be damaging to one's ego.

Festinger (1954) theorized two main factors that support this innate need for social comparison: firstly, people need subjective appraisal of their opinions and abilities. This appraisal is done by comparing to similar others, such as coactors, when an objective measure of abilities and opinions is absent. Secondly, a "fear of invalidity" (Kruglanski, 1989) develops when one is uncertain about the validity of self-evaluation. Social comparisons become necessary in these situations to ascertain validity of one's own subjective judgment.

Since Festinger, other renowned scientists have also broached this subject matter. Goethals and Darley (1987) proposed that, in the absence of other performance-related attributes, we attribute performance differences to differences in ability when drawing social comparisons. Focusing on coaction scenarios similar to those in Triplett's (1898) studies, Seta (1982) argued that coactors are motivated to socially compare among themselves so as to anticipate and/or modify the potential outcomes of the competition. By manipulating the perceived differences in performance between coacting participants, Seta (1982) managed to induce different levels of

performance motivation. He concluded that “social comparison processes are active components of coaction” (Seta, 1982). His studies also showed that feedback frequency, a proven moderator of performance level, only functioned as a competitive cue when it facilitated social comparison processes (Seta, 1982).

Since Festinger and Seta, some other researchers have further explored social comparison processes in competitive settings (Hertel, Niemeyer, & Clauss, 2008; Light, Littleton, Bale, Joiner, & Messer, 2000; Munkes & Diehl, 2003; Muller, Atzeni, & Butera, 2004; Sanders, Baron, & Moore, 1978; Todd, Seok, Kerr, & Messe, 2006). However, most of this research has dealt with directional social comparisons (such as upwards or downwards social comparisons), comparison-driven self-evaluation, and competition versus collaboration.

### **Evaluation Apprehension as an Alternative Model**

Offering a slightly different explanation to Festinger’s social comparison theory, Cottrell, Wack, Sekerak, and Rittle (1968) put forth another possible mechanism behind competitive motivation. He proposed that the fear of being assessed by another facilitates competitive performance, and coined this term ‘evaluation apprehension’ (Cottrell, 1972). Thus, individuals perform well-learned tasks better in social groups, rather than alone, when evaluative potential is present. When in the presence of experimenters, passive audiences, or coactors, people should be motivated to enhance their execution of a dominant (well-learned and easy) action (Cottrell, 1972).

In his 1987 paper, Harkins empirically validated this evaluation apprehension model. Using a 2 (Alone vs. Coaction) x 2 (Evaluation vs. No Evaluation) design, Harkins had participants take part in a vigilance task either singly or in pairs. Each subject was to report the number of times a dot was flashed on a TV screen by pressing a button. In the Evaluation condition, the participants responded normally to the flashing dots. In the No Evaluation

condition, participants were given a “Response Recording Error” message after each dot presentation during their practice session, and were informed by the experimenter that the response recorder had malfunctioned, and hence would be disabled during their actual experiment. Not only did Harkins reproduce the social facilitation effect by showing that coactors outperformed single participants, but he furthermore validated the evaluation apprehension model by proving that participants whose outputs could be evaluated did better than those whose outputs could not be (Harkins, 1987).

### **Interacting Mechanisms in Competition**

While these studies examined social comparison and evaluation apprehension as separate processes moderating competitive motivation, others allude to a possible relationship between the two mechanisms. Friend and Gilbert (1973) previously observed that participants scoring high on the Fear of Negative Evaluation (FNE) Scale tended to avoid potentially threatening social comparison information to a greater degree than those lower on FNE; Salovey and Rodin (1984) also noticed that upward social comparison engendered more anxiety towards interacting with the comparison other, as measured by the State-Trait Anxiety Inventory. Considered together, these two studies suggest that not only does the fear of evaluation affect social comparison processes, but the directionality of social comparison also reciprocally influences the anxiety experienced towards a comparison other. However, these studies do not explicitly examine how the two forces are exactly related to one another in competitive settings, leaving further validation of such a theory to be desired.

Imagine that you are at the gym, jogging on a treadmill beside another jogger. Both of you observe each other’s progress, in an effort to compare your performances, and also to evaluate each other. This scenario effectively captures how both social comparison and evaluation apprehension can act in tandem in a competitive scenario. As we actively compare ourselves to

others, we are assessing their performance for comparison purposes. At the same time, concerns about being under evaluation are engendered when we become aware of others drawing similar comparisons with us. Both of these reactions fuel competitive feelings and behavior. Hence, social comparison and evaluation apprehension are put forth as dual processes that drive competitiveness. Also, they are further suggested as reciprocally affecting processes that interact by driving each other in a mutually enhancing manner – the Yin and Yang Theory of Competition established here.

By explicitly examining the mechanistic dynamics underlying competition, this paper attempts to bridge two previously divergent theoretical lines within social psychology. The following two concepts are put forth within the Yin and Yang Theory of Competition suggested here:

1. Social comparison and evaluation apprehension are processes that work in concert within competitive settings to drive competitiveness.
2. The inclination to socially compare with one's competitor is influenced by the fear of being evaluated by the other party, and vice versa. In other words, both mechanisms work in a reciprocally affecting fashion to fuel competitiveness.

These two concepts are tested as separate hypotheses in three studies within this paper. Competitiveness is measured at the behavioral, subjective self-report, and baseline personality levels to give a comprehensive picture of how these two processes operate within the individual.

To investigate the first hypothesis of the Yin and Yang Theory of Competition, Study 1 had participants carry out a competitive typing task in pairs in the laboratory. The simple task of typing out the exact given passage was chosen to remove the confound of difficulty level, which previous social facilitation research shows would produce significant differences in performance

(Zajonc, 1965). In this study, competitiveness was measured by performance accuracy on the task.

Study 2 specifically addressed the limitations inherent in Study 1, and explicitly tested the second hypothesis introduced in the Yin and Yang Theory of Competition. It utilized a mixed factorial design priming paradigm to differentially activate concepts of comparison and evaluation concerns. Participants' self-reported levels of competitiveness, inclinations to socially compare, and feelings of being evaluated were all measured.

Lastly, Study 3 then extended these findings to the baseline trait equivalents of social comparison, evaluation apprehension, and competitiveness. It examined the correlations and predictive relationships between participants' scores on the following personality measures: Social Comparison Orientation, Fear of Negative Evaluation Scale, and the Competitiveness Index. This last study not only reinforced both hypotheses in the Yin and Yang Theory of Competition, but furthermore, showed that the theory can be applied to trait equivalents, over and above their subjective states.

### **Study 1: Twin Pillars of Competitive Behavior**

#### **Participants**

Fifty-eight participants (28 male, 30 female,  $M_{age} = 20.89$  years, age range: 18–30 years) from the University of Michigan volunteered for either course credit or pay. For all participants, their primary language was English. The purpose of this was to ensure that all participants were of similar familiarity with the language that the passages used were written in.

#### **Passages**

For every practice and experimental session, the same passages were given to each pair of participants to type out. These passages came from Rag Linen (<http://raglinen.com/>), an online educational archive of rare and historic newspapers. The purpose of selecting highly



uncommon English passages was to reduce the chances that either subject might have had prior exposure to the sources, and hence receive an unfair advantage. Samples of the practice and experimental passages are found in Appendix A and B, respectively.

### **Procedure**

Participants were randomly assigned to one of the following three conditions: coaction (C), coaction without evaluation apprehension (C without EA), and coaction without social comparison (C without SC). They arrived for the experiment in pairs and were seated at two tables placed side-by-side. A measuring tape was used to ensure that the computers on the tables were the same distance from each edge of the table, and hence, equidistant from every participant. After which, the participants were each provided with the same passage to type out as quickly and accurately as possible. They were instructed to audibly announce, "Done!" loud enough for the other coactor to hear, upon completion of each paragraph.

A 2-minute practice round was administered to every subject before the actual experimental round. The practice passage was always the same for all participants. During the practice round, the experimenter was present to give the participants feedback as to whether they were announcing, "Done!" loudly enough for the other participant to hear.

At the start of the experimental round, participants were told that they were competing against each other, and that the fastest and most accurate subject of the week would win a monetary performance-based bonus. They were given 4 minutes to type as much of the experimental passage out as accurately as possible. The experimenter announced the start of time and left the room during this entire 4 minutes. This was to minimize experimenter effects. At the end of the 4 minutes, the experimenter would re-enter the room and announce the end of the session. Participants were told to stop typing at this point in time.

Participants randomly assigned to the C condition competed against each other in typing out the passages in a normal coaction setting (see Figure 1a). Those in the “C without EA” and “C without SC” conditions were one of each of the participants making up concurrently participating pairs. In other words, for every pair of participants in either of these conditions, one would be in the “C without EA” condition while the other was in the “C without SC” condition. Those in the “C without SC” condition were asked to put on sound-blocking earplugs covered by headphones before the start of their experimental round. This prevented them from hearing the progress of the other coactor, thereby effectively preventing social comparison. Seated next to these “C without SC” participants in the same pairs, the “C without EA” participants could still hear the formers’ progress, by keeping track of how quickly the other person was announcing, “Done!” Hence, people in the “C without EA” condition could still draw performance comparisons, but knew that they were not under such evaluation (see Figure 1b).

## Results

An ANOVA was conducted to test the differences in accuracy across the three conditions. Accuracy was chosen over reaction time due to the large individual variance in typing skill, which was a potential confound with regards to speed. Accuracy was found to be significantly different in each condition,  $F(2,56) = 3.55, p = .020$ . Participants in the C condition had a mean accuracy of 99.58%, those in the “C without EA” condition had a comparatively lower mean accuracy of 99.36%, and participants in the “C without SC” condition produced the lowest accuracy results, with a mean of 99.03% (see Figure 2). As expected, reaction times were not significantly different across conditions,  $F(2,56) = .61, p = .608$ , possibly due to the large variance in individual skill. Overall, there was an average of 250.91 characters typed per minute. Controlling for reaction time, post-hoc regression contrast analyses revealed that participants in the C condition had significantly higher accuracy than those in the “C without SC” condition,  $\beta$

= 3.77,  $p = .004$ . A further conducted ANOVA linear contrast also showed a significant linear pattern of decreasing accuracy across the three conditions,  $F(2,56) = 4.18, p = .02$ .

### **Discussion**

The linearly decreasing pattern of mean accuracy across C, “C without EA”, and “C without SC” conditions, in order, demonstrated that competitive performance was compromised when the subject was deprived of the chance to either feel evaluation apprehension or to socially compare. Performance under normal coaction conditions, with both mechanisms at work proved to be optimal. Such coactions arrangements are usually the case in most competitive settings in real life, such as when two swimmers are competing against each other simultaneously, when two students are being graded against each other in a curved class, and when two employees hold the same position within a company and are vying for the same salary bonus. When evaluation potential is removed, performance is facilitated less than when it is present, as the drop in accuracy from the C to the “C without EA” condition illustrates. Taking away the capacity to feel evaluation apprehension – perhaps because of reduced identifiability (Harkins, 1987) or just lowered arousal (Zajonc, 1965) – causes decrements in performance. Similarly, but to a greater extent, competitive performance is hindered when comparisons cannot be drawn between coactors.

Hence, the following conclusions can be reached: both social comparison and evaluation apprehension are mediators of competitive behavior under competitive coaction settings. Therefore, these results successfully reinforced previous research that both processes drive competitive behavior. This study further alluded to the joint facilitative effect that these two mechanisms exert on competitive behavior, suggesting that they interact rather than act separately. Furthermore, given the inferior mean performance in the “C without SC” condition,

as compared to that in the “C without EA” condition, social comparison processes are posited as the stronger driver of competitive behavior, as compared to feelings of evaluation apprehension.

Nonetheless, this study has its own inherent limitations. Firstly, competitiveness is a subjective state that cannot always be measured by objective performance, which are its behavioral manifestations. Secondly, while this study showed that social comparison and evaluation apprehension do drive competitiveness within the same context, it did not show by what means these two mechanisms interact to do so. Thirdly, the laboratory manipulation only accounted for this particular competitive scenario, and may not be generalizable to all competitive settings, especially on more complex tasks.

Therefore, Study 2 thus sought to address these limitations. To overcome the first problem, Study 2 measured subjective feelings of competitiveness using self-report measures; it also addressed the last two problems by measuring participants’ reactions to a priming paradigm depicting two cyclists in a cycling competition. Lastly and perhaps most importantly, Study 2 went on to test exactly how social comparison and evaluation apprehension processes work in tandem to drive competitive motivation. This translates into the second hypothesis of a “yin and yang” relationship between these two mechanisms.

### **Study 2: Yin and Yang Theory of Competition**

Study 2 addressed the three core limitations of Study 1 by using a mixed factorial design priming paradigm situated in a competitive cycling setting. Self-report measurements were obtained for the dependent variables, namely social comparison inclinations, feelings of evaluation apprehension, and feelings of competitiveness. Both hypotheses in the Yin and Yang Theory of Competition were tested here. Self-reported feelings of competitiveness were expected to be significantly higher when either social comparison or evaluation apprehension were

primed. In accordance with the second hypothesis in the theory, higher social comparison inclinations were expected to correspond to greater feelings of evaluation apprehension.

### **Participants**

181 participants (67 male, 95 female, 19 unreported,  $M_{age} = 22.04$  years, age range: 18–40 years) from the University of Michigan were recruited through an email solicitation. They took the online survey on a voluntary basis and did not receive any compensation for it. The response rate was approximately 20%. According to previous research, web-based studies have been shown to be equally reliable and generalizable, as compared to their paper-and-pencil counterparts (Gosling, Vazire, Srivastava, & John, 2004). Contrary to the criticism that web-based studies may be self-selective in nature, Gosling et al.'s (2004) findings show that potential nonserious or repeated responders do not significantly affect the results, and that data is still consistent with that of traditional methods.

### **Procedure**

This study used a 2 (SC versus EA) x 2 (present versus control) mixed factorial design. Participants who took part in this mixed factorial design were randomly assigned to either the social comparison (SC) or evaluation apprehension (EA) conditions. These two conditions were the between subjects factor. Presentation order of the “present” and “control” primes within each of these between subjects conditions were counterbalanced among participants. The same picture prime (see Figure 3) was used to prime all 4 conditions. Only the accompanying descriptive vignettes, as described below, varied across conditions.

In the SC condition, participants were presented with the “SC control” and “SC present” primes, in counterbalanced order. In the “SC control” condition, the following vignette was presented:

Put yourself in the shoes of the blue cyclist on the right of the picture. You are vying for the top position in this cycling race against your closest rival in red (on the left). In this instance, you are taking a glance at the flags that are being waved in the background.

The “SC present” condition vignette was as follows:

Put yourself in the shoes of the blue cyclist on the right of the picture. You are vying for the top position in this cycling race against your closest rival in red (on the left). Throughout the competition, you are constantly comparing your progress and performance timing with your competitor because you want to come out on top. In this instance, you are directly watching your competitor as he gears in for the final leg of the race.

Similar vignettes were used in the EA condition, in which participants were presented with the “EA present” and “EA control” primes in counterbalanced order. In these conditions, evaluation apprehension degree was manipulated rather than social comparison. Participants in the “EA control” condition read the following scenario:

Put yourself in the shoes of the red cyclist on the left of the picture. You are vying for the top position in this cycling race against your closest rival in blue (on the right). In this instance, your competitor is taking a glance at the flags that are being waved in the background.

Those in the “EA present” condition were presented with the following vignette:

Put yourself in the shoes of the red cyclist on the left of the picture. You are vying for the top position in this cycling race against your closest rival in blue (on the right). Throughout the competition, your progress and performance timing are constantly being evaluated by your competitor because he wants to come out on top. In this

instance, your competitor is directly watching you as you gear in for the final leg of the race.

After presentation of each picture prime with its accompanying vignette, participants answered three questions: social comparison inclinations were measured by responses to the question, “To what extent do you feel inclined to compare your own progress to your competitor’s progress?” (1 = *Not At All*, 7 = *Very Much*); degree of evaluation apprehension was ascertained in the query, “To what extent do you feel evaluated by your competitor?” (1 = *Not At All*, 7 = *Very Much*). Lastly, competitiveness was measured by the question, “How competitive do you feel towards your competitor?” (1 = *Not At All*, 7 = *Very Much*). One of the questions served as a manipulation check, depending on whether the participants were in the SC (SC question as manipulation check) or EA (EA question as manipulation check) condition.

## Results

Paired t-tests were conducted to compare between participants’ mean responses on each dependent variable in the within subjects conditions (present versus control conditions).

Consistent with the SC primes, the self-reported inclinations to socially compare yielded a significantly higher mean in the “SC present” condition ( $M = 5.91$ ,  $SD = 1.15$ ), as compared to the “SC control” condition ( $M = 5.16$ ,  $SD = 1.65$ ),  $t(77) = 5.34$ ,  $p < .001$ . These manipulation check results supported the effectiveness of the primes used. As predicted, feelings of competitiveness were significantly higher in the “SC present” condition ( $M = 6.35$ ,  $SD = .96$ ), as compared to the “SC control” condition ( $M = 5.61$ ,  $SD = 1.55$ ),  $t(77) = 5.07$ ,  $p < .001$ . Most importantly, participants reported stronger feelings of being under evaluation in the “SC present” condition ( $M = 4.70$ ,  $SD = 1.71$ ), as compared to those in the “SC control” condition ( $M = 4.13$ ,  $SD = 1.89$ ),  $t(77) = 3.51$ ,  $p = .001$ . Figure 4 captures these results.

Consistent with the primes in the EA condition, the feelings of being evaluated that participants reported were significantly higher in the “EA present” condition, which had primed evaluation ( $M = 5.88, SD = 1.28$ ), than in the “EA control” condition ( $M = 4.45, SD = 1.58$ ),  $t(74) = 8.96, p < .001$ . Hence, the primes were concluded to be effective, as shown in this manipulation check. These results corresponded to the self-report results on the other measures of social comparison and competitiveness, as predicted. Participants reported feeling significantly more competitive in the “EA present” condition ( $M = 6.56, SD = .68$ ) than in the “EA control” condition ( $M = 6.23, SD = .98$ ),  $t(75) = 3.89, p < .001$ . In addition, participants were more inclined to socially compare themselves in the “EA present” condition ( $M = 6.16, SD = 1.18$ ), rather than in the “EA control” condition ( $M = 5.67, SD = 1.29$ ),  $t(75) = 3.59, p = .001$ . Figure 5 captures these results.

## **Discussion**

When social comparison and evaluation apprehension were primed, subjective self-reports of competitiveness were significantly higher than in the control conditions. Also, priming either of these mediators enhanced subjective feelings of the other, illustrating how they both worked together in a reciprocally enhancing relationship to drive competitive feelings.

Taken together, Studies 1 and 2 demonstrated how competitiveness is concurrently driven by social comparison and evaluation apprehension processes, and how these mediators work in a mutually enhancing manner to achieve this. Thus, establishing the Yin and Yang Theory of Competition at the behavioral and context-dependent state levels. Study 3 further built on these findings to show how the mechanisms of social comparison and evaluation apprehension also affect dispositional competitiveness.



### **Study 3: Dispositional Equivalents**

Study 3 extended the findings from Studies 1 and 2 to further support both hypotheses within the Yin and Yang Theory of Competition at the trait level. It examined the correlations and predictive relationships between personality measures that measure the trait equivalents of social comparison, evaluation apprehension, and competitiveness. In this case, the personality measures used include the Social Comparison Orientation (SCO) measure, Fear of Negative Evaluation (FNE) scale, and the Competitiveness Index (CI). This follows the line of reasoning that the contextual effects of social comparison inclinations, concerns of being evaluated, and competitiveness are considered to be manifest among people with such dispositional behaviors. It further provides an understanding of how each of these mediators and competitiveness are fundamentally related to one another at the baseline trait level in individuals.

To test the first hypothesis expounded by the theory, Study 3 first examined the relationship between each of the mediators and competitiveness in a regression analysis. If these mediators drive competitiveness, as proposed in the first hypothesis, then both SCO and FNE scores should be predictive of the individual's scores on the CI. If the second hypothesis is also true, such that social comparison and evaluation apprehension are reciprocally enhancing processes, then scores on the SCO and FNE would be expected to be significantly correlated and predictive of each other. These predicted results would reflect a linear relationship between social comparison and the fear of evaluation at the baseline personality level, illustrating that an increase in one is associated with a corresponding increase in the other, and vice versa.

Participants were recruited from a real sample of competitive ballroom team dancers from the University of Michigan Ballroom Dance Team.

## **Participants**

37 participants (13 male, 19 female, 5 unreported, *M*<sub>age</sub> = 20.94 years, age range: 18–27 years) were recruited from the University of Michigan Ballroom Dance Team. They were each compensated \$5 each for taking a 10-minute online survey. Of the 37 recruited, 2 did not complete all the questions in all three personality measures within the survey, hence their data was not used in the analysis.

## **Procedure**

Participants were first primed with the following vignette: “Imagine that you are competing in a dance competition against your greatest rival of the same gender as you. Please write down this competitor's initials here.” The purpose of this prime was to activate a mental concept of a competitive scenario and to narrow focus on a particular rival, rather than leave open the possibility of different numbers of competitors. They were then asked to fill out some filler questions before these three personality measures were presented: Social Comparison Orientation (SCO) measure, the Fear of Negative Evaluation (FNE) scale, and the Competitiveness Index (CI). The SCO measure was obtained from Gibbons and Buunk (1999), while the FNE scale is the one designed by Leary (1983). Trait competitiveness was measured using the Competitiveness Index designed by Smither and Houston (1992). Participants completed all three scales as part of the questionnaire.

## **Results**

Regression and correlation analyses were used to assess the relationship between participants' scores on the Social Comparison Orientation scale, Fear of Negative Evaluation scale, and the Competitiveness Index. As predicted by the Yin and Yang Theory of Competition, the results obtained confirmed each of the hypotheses put forth in the theory.

To show that both social comparison and evaluation apprehension mechanisms work in

concert to drive competitiveness (hypothesis 1), a regression was carried out to examine how predictive of competitiveness each of these traits were. Results showed that SCO scores significantly predicted CI scores,  $\beta = .67, t(33) = 5.26, p < .001$ . Similarly, FNE scores were virtually significantly predictive of CI scores too,  $\beta = .31, t(33) = 1.87, p = .07$ . This marginal significance could be due to the small sample size used, accounting for the low statistical power in the analysis. Overall, these findings echoed the results of Study 1, showing that both social comparison and the fear of evaluation are predictive of competitive feelings. Since SCO scores accounted for a greater percentage of the variance in CI scores than FNE scores did, these results further replicate the Study 1 conclusion that social comparison is the stronger driving force behind competitiveness, out of the two.

Study 3 results also proved the second hypothesis in the Yin and Yang Theory of Competition by demonstrating a reciprocal relationship between social comparison and evaluation apprehension. Results yielded a strong, positive correlation between social comparison orientation (a trait measure of social comparison) and the fear of negative evaluation (the equivalent measure of trait evaluation apprehension),  $r = .48, n = 35, p < .01$ . This relationship was still significant even when controlling for CI scores in a bivariate correlation,  $r = .38, n = 35, p < .05$ . Hence, someone who scores high on SCO also scores high on FNE, and vice versa. Regression analyses also showed that both mechanisms were significantly predictive of the other,  $\beta = .51, t(33) = 3.42, p = .002$ . These findings show that SC and FNE are deeply inter-related, reinforcing the second concept introduced in the Yin and Yang Theory of Competition that they are reciprocally affecting mechanisms.

## **Discussion**

In a nutshell, both mechanisms inherently contribute to driving competitiveness within an individual. Thus, someone who has stronger innate tendencies to socially compare with others, or

who fears negative evaluation to a greater extent, has more competitive personality traits. This pattern holds over and above subjective contextual influences, extending to the personality trait level, as illustrated in this Study. In addition, the mechanisms of social comparison and evaluation apprehension are fundamental, innate levers of competitiveness that reciprocally influence one another within the individual's personality. Hence, the Yin and Yang Theory of Competition is established at the trait level within this Study.

### **General Discussion**

Both the following hypotheses that constitute the Yin and Yang Theory of Competition were supported by these three studies. In Study 1, as either the capacity to socially compare or to feel evaluation apprehension were removed, competitive performance dropped from its optimal level in the normal coaction condition. This demonstrated how both social comparison and evaluation apprehension processes work in concert to drive optimal competitive behavior – the first hypothesis put forth in the Yin and Yang Theory of Competition. Study 2 differentially primed concepts of either social comparison or evaluation apprehension, and measured subjective self-reports of social comparisons inclinations, evaluation apprehension, and feelings of competitiveness. The results not only reinforced Study 1's findings, but were further consistent with the second hypothesis that both processes are reciprocally enhancing in nature. Lastly, Study 3 utilized personality measures to extend these findings to the trait level. Taken together, the three studies established the Yin and Yang Theory of Competition at the behavioral, subjective state, and trait levels of competitiveness.

### **Limitations and Future Directions**

Notwithstanding, this paper acknowledges possible limitations inherent in the studies: Firstly, there are possibly other mediators of competitiveness, apart from evaluation apprehension and social comparison, which might also come into play. These may also interact

with the fear of assessment in driving comparison processes, but have not been explored in this paper. Future studies could look into how these possible mediators also affect the interaction between social comparison and evaluation apprehension processes. For example, the degree of attentional distraction caused by the coactor, arousal levels, the extent of awareness of being evaluated, and how much comparisons are actively being made.

A second limitation presents itself in the use of only a simple, routine typing task in first behavioral experiment. This restricts the performance implications to only such well-learned competitive coaction tasks, reducing generalizability to other more difficult undertakings. Similarly with the first limitation listed, perhaps future experimentation may extend these behavioral tests to more difficult competitive coaction task.

Future directions that these studies may be taken in are suggested. Our fear of evaluation and active tendencies to compare with others may not affect the self at the same level of conscious awareness. Hence, studies could be conducted to determine what levels of awareness these two processes operate at. At the same time, the dynamics of this interaction between social comparison and evaluation apprehension could be explored more in-depth, at the level of mental activity and self-regulation.

### **Theoretical Implications**

Nevertheless, the Yin and Yang Theory of Competition bridges what has been previously very divergent fields of study, namely social comparison literature and social facilitation literature. First put forth by Festinger (1954) and Cottrell (1972), social comparison and evaluation apprehension, respectively, have been implicated as two core processes that drive competitive behavior. While previous research has implicitly associated social comparison processes with the fear of evaluation, through measures such as the Fear of Negative Evaluation Scale (Friend & Gilbert, 1973) and the State-Trait Anxiety Inventory (Salovey & Rodin, 1984),

this research now throws light on exactly how these two mechanisms interact within the same competitive context. On top of this, the theory is shown to apply to competitiveness at the behavioral, context-dependent (subjective state), and baseline personality levels.

Within the social comparison literature, this research offers a new perspective of the affective consequences of upwards and downwards social comparison. According to Collins (2000) in the *Handbook of Social Comparison*, social comparison literature makes the crucial assumption that “the evaluative implications of comparison are intrinsic to its direction.” Social comparisons often evoke negative feelings of envy and self-depreciation (in upwards social comparison) or hubris (in downwards social comparison), which are seen as indicators that one should stop such detrimental comparisons. They do also lead to positive emotions such as determination, in the case of upwards social comparison, and self-confidence when downward social comparisons are drawn. With the Yin and Yang Theory, these feelings can now be possibly explained in a new light.

Comparing upwards could potentially increase feelings of evaluation anxiety towards the comparison other, which could prompt increased self-evaluation and hence, self-scrutiny. This could either heighten feelings of envy and jealousy, or lead to stronger determination on one’s part to close the performance gap. The latter phenomenon is in line with social facilitation findings that identify evaluation apprehension as a facilitative mechanism of performance on easy, well-rehearsed tasks (Cottrell, 1972). In downwards social comparison, comparisons lead to the evaluative conclusion that the comparison other does not stand up to one’s ability. Such knowledge is a double-edged sword, in that it could lead to either more self-confidence or hubris – which the Greeks defined as excessive arrogance. Hence, this research offers the social comparison “direction” literature a fresh take on an age-old problem.

### **Practical Implications**

Apart from such theoretical contributions, this line of study has very real-world applications too. The Yin and Yang Theory of Competition proposed here has wide-ranging implications for organizational behavior. It suggests that when we compete, our motivation level is simultaneously bolstered by the active process of social comparison and its counterpart, evaluation apprehension.

Motivating employees within a firm entails acknowledging that both mediators of competition must be activated at the same time to ensure optimal performance. To achieve this, the organizational reward system should be in line with identifiable individual performance. These suggestions are in line with previous research by Harkins (1987), which proposed that the identifiability in individuals' contributions enhances evaluation apprehension, and is hence, essential in preventing social loafing and facilitating performance.

The Yin and Yang Theory of Competition can also be applied to inter-group rivalry, such as in athletic teams or competing organizations. It overturns the belief in what many perceive as a psychological advantage in asymmetrical information flow, or in other words, that having more information about rivals' performance than they do is beneficial. This theory suggests that team leaders should instill in their group members the belief in the possibility that the rival group has full information regarding performance evaluations – whether or not they actually do. Despite seeming counterintuitive, this move triggers group members' concerns about evaluation and social comparison inclinations, enhancing their competitive feelings and performance. Therefore, perceiving unidirectional information flow as advantageous is not only self-delusional, but further serves as a counterproductive psychological handicap when it comes to the crunch in competition.

**Conclusion**

In conclusion, the Yin and Yang Theory of Competition provides a fresh perspective that bridges the gaps within and among existing social psychology literatures. It shows that social comparison and evaluation apprehension are not disjunct and unrelated process in competition, as previously thought. Rather, they are highly correlated to one another, working in concert and in a reciprocally affecting fashion to drive competitive behavior, state, and traits. Given the ubiquity of competitive settings in everyday life, the Yin and Yang Theory of Competition affords us a more comprehensively applicable understanding of how our competitive drives are influenced by these interconnected and interdependent forces within us.



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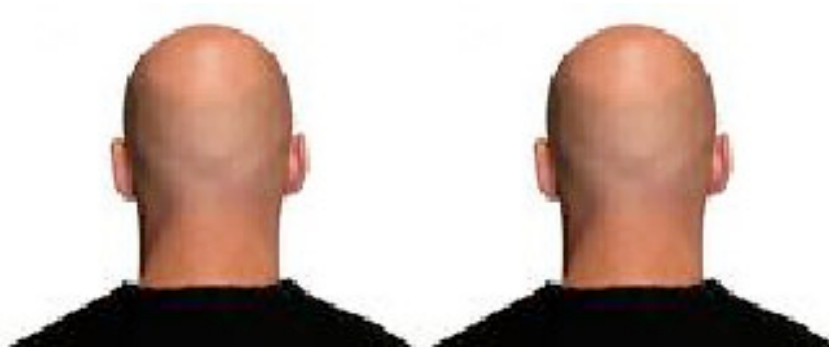
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### Author Note

Patricia Chen, Department of Psychology, University of Michigan, Ann Arbor.

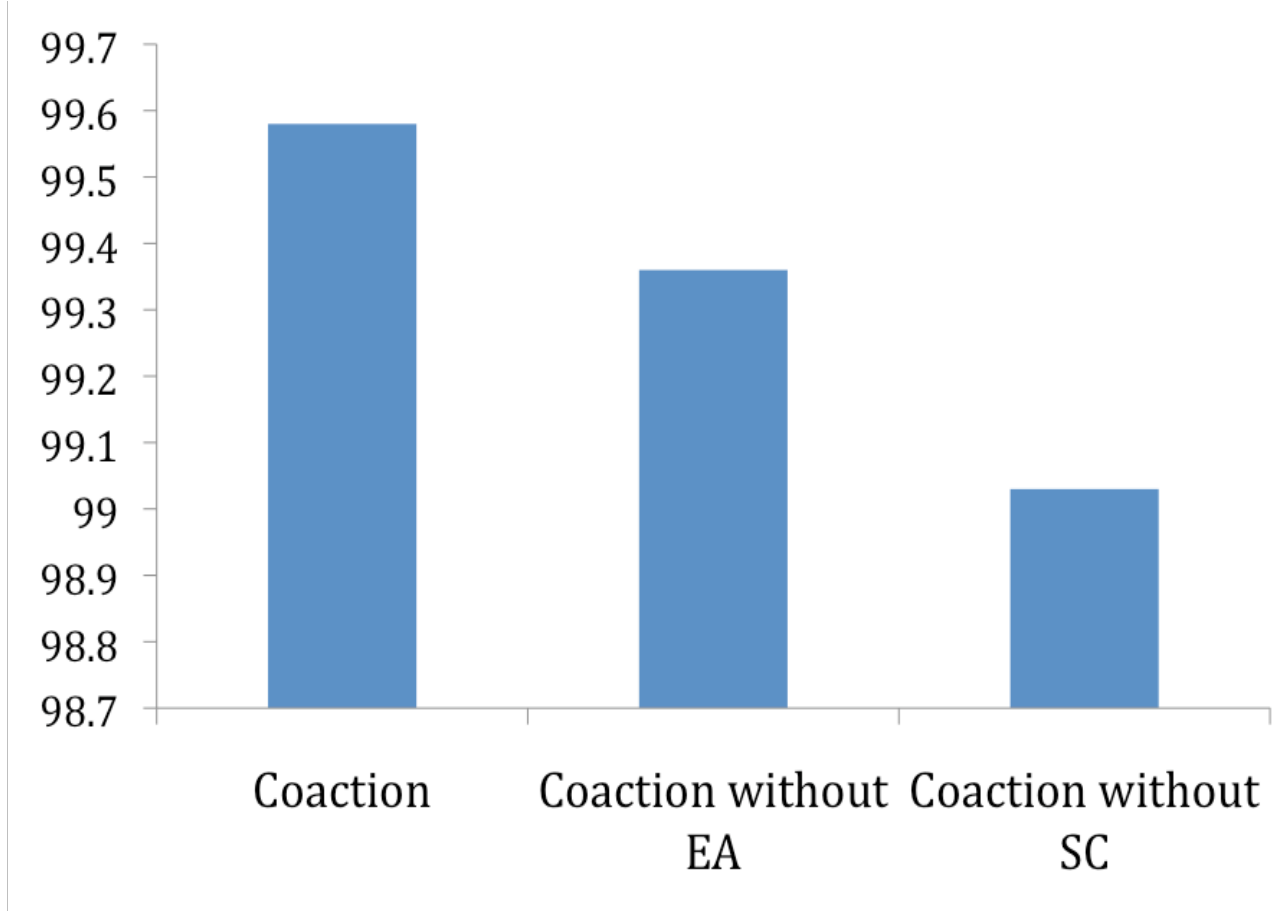
I would like to express my utmost gratitude towards Professor Stephen M. Garcia for his guidance, for always being available when I needed his advice, and for honoring me with the opportunity to work so autonomously under his wing. A big thanks to the Psychology Honors Department, Organizational Studies Department, and LSA Honors Program, all of which have given me much the needed support in this lengthy endeavor. Last but not least, I would like to acknowledge the intangible support that my graduate student mentor, Katherine Sledge Moore, friends and family never ceased to provide. Your moral support has encouraged me through this developmental journey.



*Figure 1a.* Participants in the Coaction (C) condition both do the competitive typing task simultaneously. They are given 4 minutes to type out the same passage as quickly and as accurately as possible.



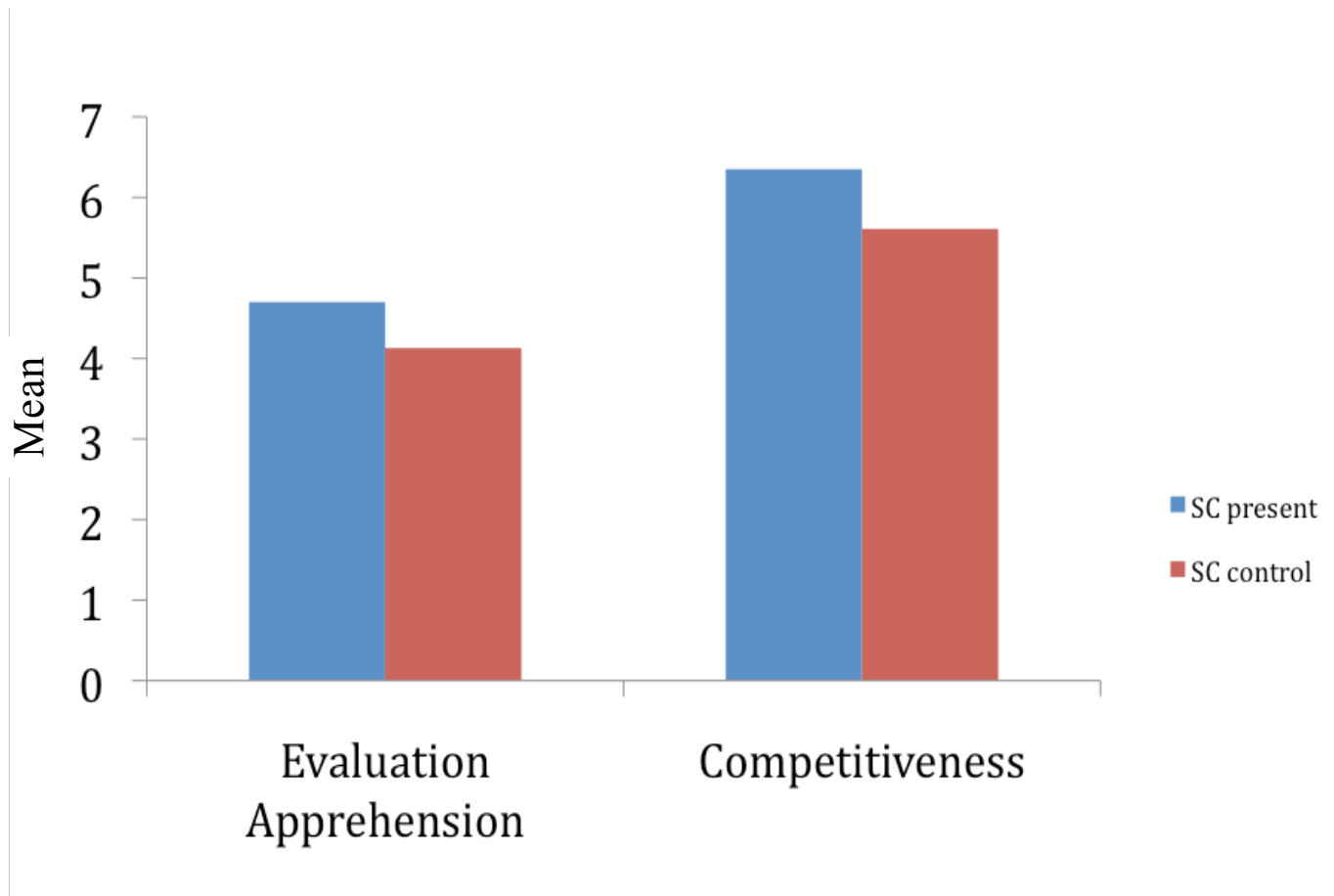
*Figure 1b.* The subject on the left with the sound-blocking headphones is in Coaction without Social Comparison (C without SC) condition. The subject on the right without the headphones is in the Coaction without Evaluation Apprehension (C without EA) condition.



*Figure 2.* Mean Accuracy in percentages across conditions in Study 1. The results in Study 1 show a linearly decreasing pattern of mean accuracy across the three conditions in the following order: Coaction (C), Coaction without Evaluation Apprehension (Coaction-EA), and Coaction without Social Comparison (Coaction-SC).

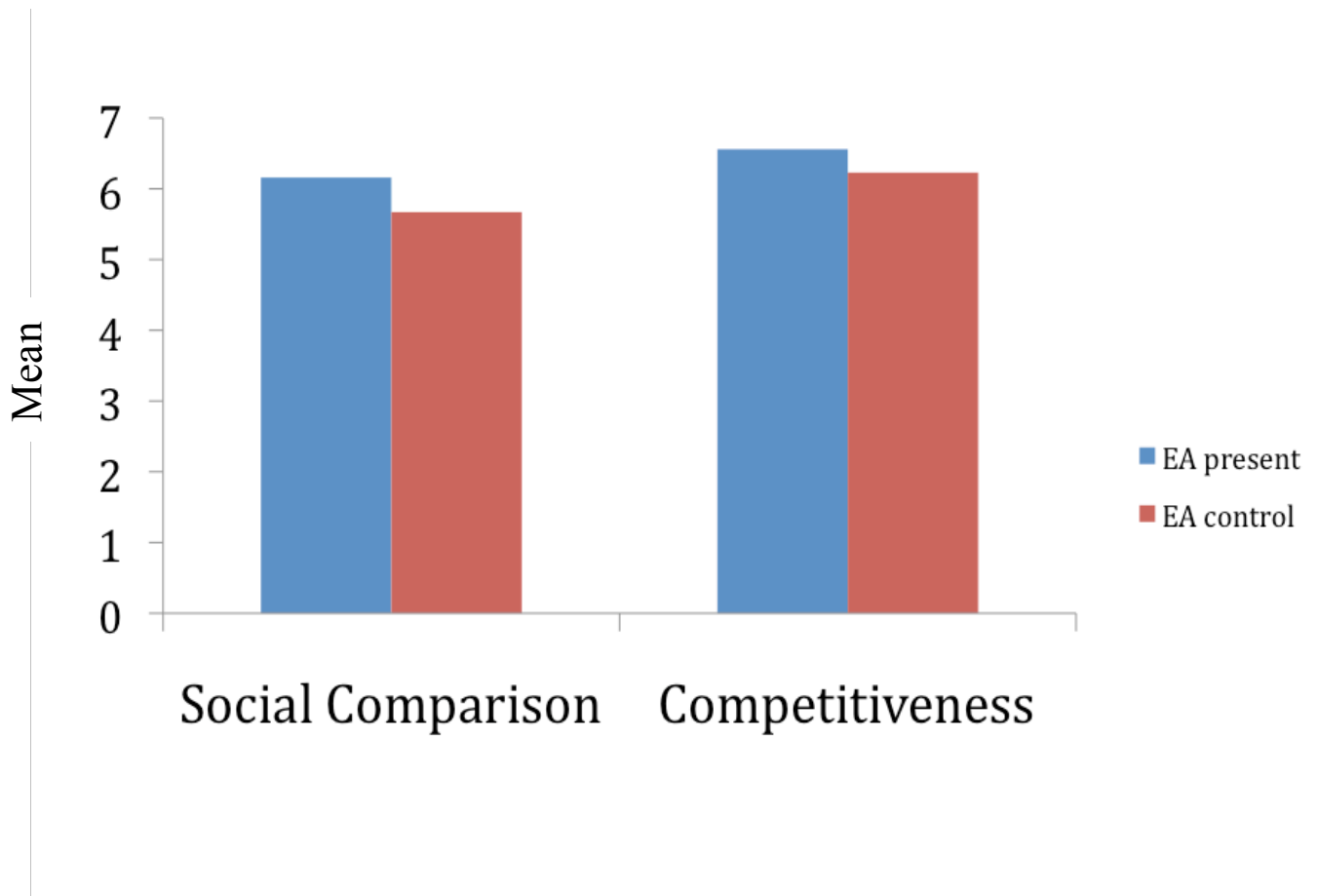


*Figure 3.* Picture prime accompanied by different vignettes for all 4 conditions in Study 2.



*Figure 4.* Mean dependent variables for SC Present and SC Control conditions. Paired t-test results for the evaluation apprehension and competitiveness DVs in each of the SC Present and SC Control conditions. All mean self-report scores are significantly higher when SC is primed in the “SC present” condition than in the “SC control” condition. This supports the Yin and Yang Theory of Competition, as activating SC corresponds to greater feelings of evaluation apprehension. Higher levels of both social comparison and evaluation apprehension both contribute to greater competitiveness experienced.





*Figure 5.* Mean dependent variables for EA Present and EA Control conditions. Paired t-test results for the social comparison and competitiveness DVs in each of the EA Present and EA Control conditions. All mean self-report scores are significantly higher when EA is primed in the “EA present” condition than in the “EA control” condition. This supports the Yin and Yang Theory of Competition, as activating EA corresponds to greater feelings of social comparison. Higher levels of both social comparison and evaluation apprehension both contribute to greater competitiveness experienced.

## Appendix A

## Practice Passage in Study 1

This is an ultra rare colonial newspaper and easily one of the most famous papers of the era because it was printed by Benjamin Franklin as indicated by the imprint at the bottom of the back page that famously states “PHILADELPHIA: Printed by B. FRANKLIN, Post-Master, and D. HALL, at the New-Printing-Office near the market.”

This imprint only appeared in the Gazette through 1765 and according to one newspaper historian, many issues of this period are not found with the imprint as it often appeared on the advertising leaf, commonly thrown away.

Even more rare is finding a pre-1750 issue! At this time, only 12 colonial newspapers even existed. This is a complete issue in absolutely fantastic condition with all four pages and the Franklin imprint intact.

This front page features international news from Constantinople, London, Paris, Brussels, Madrid and much more. Inside the issue includes a “humble Address of the Mayor and Commonalty of the City of Philadelphia,” and signed in type by “CHARLES WILLING, Mayor.”

Launched on December 24, 1728, the Pennsylvania Gazette was one of the first Colonial newspapers ever. Benjamin Franklin bought the Gazette in 1729 and gave the paper a brightness and liveliness unknown before to any colonial paper except his brother’s New England Courant, according to American Journalism by Frank Luther Mott.

But the Gazette was decidedly a better newspaper than the Courant, more rounded, with superior news handling, greater advertising, and a handsomer appearance, wrote Mott. Franklin was more fully aware of the possibilities, limitations, and responsibilities of colonial journalism than were most of his fellow editors, Mott added.

Extremely rare and pristine condition! One of the first 23 issues of the very first English-language newspaper, which was temporarily printed in Oxford, England while King Charles II was “avoiding the plague.” After the 23rd issue, it moved to London. This issue includes “The Account of the weekly Bill runs thus, Total 375. Plague 158. Increased 110.”

Also features reports of Council of War, King of England, King of Spain, Pope Clement the Eighth, Men of War, Prince of Monaco, and “News of the Death of the Queen Mother of France, Anne of Austria, Sister of the late Philip the Fourth of Spain.”

The London Gazette is the oldest continually-published newspaper in the world. It began printing in Oxford, England on November 16, 1665 while King Charles II was avoiding the plague.

This rare 1667 issue of the London Gazette features reports of small pox, plague, Spanish horses, “Ratification of the Treaty,” and West-India Company.

The London Gazette is the oldest continually-published newspaper in the world. It began printing in Oxford, England on November 16, 1665 while King Charles II was avoiding the plague.

It was called the Oxford Gazette and many sources, including Britannica and newspaper historian Mark Mitchell, consider it to be the first English-language newspaper (it was the first to fit the definition of the term “newspaper”). After the 23rd issue of the Oxford Gazette, the King felt the plague was subsiding so he moved the paper back to London where it resumed as the London Gazette.

While it originated as a weekly paper, the Gazette continues to be published each weekday in 2008 as an official record of British government. Many of the first 23 Oxford Gazette issues are worth close to \$5,000 - this complete issue of the London Gazette is \$450 and in excellent condition.

This rare newspaper includes a historic early printing of John Adams 1796 election results, which declare John Adams President. Though reports of John Adams election did not appear until January 1797, as the vote counting process was so protracted, the General Advertiser leaned anti-Federalist and, as such, claimed early victory for Adams.

On the second page is a complete printed table of election results “Return of Votes for PRESIDENT and VICE PRESIDENT” with votes tallied from 16 states and totals showing Adams with 71 votes, Pinckney with 59, Jefferson with 57 and Burr with 23. Other noteworthy content is a letter from “PLAIN TRUTH” about “The President’s last speech”.

The Philadelphia Aurora General Advertiser was published daily by Benjamin Franklin Bache, grandson of Benjamin Franklin. The paper was printed at the printing company that Franklin is believed to have founded.

Three weeks earlier in New York City, George Washington took the oath of office as the first President of the United States. This historic New York newspaper treasure features the election of George Washington as the first U.S. President and includes three letters written by him.

An address by John Adams as President of the Senate (Vice President) is also included, as well as congratulations to Washington by various political and public organizations.

This document is signed in type near the top of the second column: Abraham Lincoln. The balance of the front page is mostly taken up with Civil War reports and includes two one column maps as well. This issue is in unusually nice condition - well inked, good margins, and little to no rubbing. One of the gem issues of the 19th century!

The front page, at the top of the fourth column, of this Massachusetts newspaper is a full printing of the Emancipation Proclamation issued by

## Appendix B

## Experimental Passage in Study 1

The front page contains a special public notice from Henry Knox of the War Office of the United States to all Commissioned Officers, Non-commissioned Officers and Privates of the late Army of the United States regarding who is entitled to Lands from the United States.

Page two includes “An Address of the Delaware Society for promoting domestic Manufacturers to his Excellency George Washington, President-General of the United States.” The letter is immediately followed by a three-paragraph letter response from George Washington, signed in type “G. WASHINGTON”. This page also contains the “Proceedings of Congress - House of Representatives of the United States - Saturday, May 16”.

Page three includes “An Address of the Senate to the President of the United States, in answer to his speech to both Houses of Congress” and is signed in type “In Senate, May 16th, 1789. Signed by order, JOHN ADAMS, President of the Senate of the United States.” The letter is immediately followed by George Washington’s response, signed “G. WASHINGTON”.

Also on page three, “The Address of the Ministers, Church Wardens and Vestrymen of the German Lutheran Congregation in and near Philadelphia, to his Excellency GEORGE WASHINGTON, President of the United States.” This is immediately followed by Washington’s response signed in type “G. Washington”.

Also on page three: “Saturday, agreeable to the Constitution, the Senate of the United States was classed. The classes were determined by lot, and are as follow, viz.” A list of names separated by class immediately follows.

What makes this newspaper extremely rare and highly desirable is that it is from New York City, which was the national capital at the time and the place where the Constitution of the United States was ratified and where, in 1789, George Washington was inaugurated as the first President of the United States. The first United States Congress assembled in New York City for the first time in 1789.

This annual volume contains a great deal of reporting and details about the historic Boston Tea Party and the prelude to the American Revolutionary War. On page 49, we read that “The town of Boston, which had been so long obnoxious to government, was the scene of the first outrage.

“In this state, it was easily seen by the people of the town, that the ships lying so near, the teas would be landed by degrees, notwithstanding any guard they could keep, or measures take to prevent it; and it was as well known, that if they were landed, nothing could prevent their being disposed of, and thereby the purpose of establishing the monopoly and raising a revenue fulfilled.

In August of 1712, the first English tax stamp on newspapers was enforced. These two issues of *The Spectator* are among the first newspapers to feature the red tax stamp. The English Stamp Act of 1712 was aimed at eliminating small newspapers who were the most vocal toward government - a less direct form of censorship.

*The Spectator* is one of the more famous "coffee-house" newspapers of the early 18th century, published by the famed Addison and Steele. These two 1712 issues are uniquely untrimmed and contain the full red-inked tax stamp - the October 14, 1712 issue is on the front side and the November 14, 1712 issue is on the back side.

Launched in 1705, *The Edinburgh Evening Courant* (titled *Edinburgh Courant* until 1718) was one of Scotland's first regional newspapers and among its finest. Issues prior to 1730 are extremely difficult to find as these are the earliest Scottish newspapers and contain many important events in Scottish, British and World history. Some believe that Daniel Defoe was one of its early editors.

The August 1726 issue features two rectangular engravings above the title on the front page with an ornately engraved first letter and red tax stamp on the front cover. The July 1728 issue features a front page ornately engraved first letter and red duty stamp on the inside page.

Each of these papers carries extensive commentary on Thomas Jefferson's second State of the Union, which was on the topic of the Louisiana Territory. Other articles include historical information on the Territory, a tribute to Lord Nelson, session of Admiralty Court, numerous ads and notices.

Aside from additional commentary and history on Louisiana, the January 13, 1803 issue contains other reports and letters regarding the topic, including a news brief that states "Letters are said to be received at New York, from our Minister at Paris, dated as late as the middle of Nov. which state, "That the French have given up the idea of taking possession of Louisiana for the present."

Later in the same issue, "Considerable light has been thrown upon the intentions of the French in this particular, in a very curious performance, written by one of Bonaparte's counsellors of state. In this paper, the arguments in favour of attacking St. Domingo, and of resuming Louisiana is copiously displayed. The objections arising from the adverse interests of Spain, England and America, are placed in a most striking point of view."