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COMMUNICATION MESSAGES AND PATTERNS IN IT-ENABLED MARKETS

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ABSTRACT

This article explores the effects of communication messages on market performance in electronic market designs specifically in a group-buying setting. Drawing on theory from economics, psychology, and information systems, we develop an exploratory model of message relationships for a social buying setting that posits the effect of the nature of these messages, i.e., emotional message and more utilitarian price-oriented messages among buyers. Our paper analyzes the messages of participants in an economic experiment whereby participants attempt to organize for a collective bid. Focusing on the effects of these messages on buyer performance measured by buyer surplus, i.e., profit, and time to task completion, the results add to the growing research of group buying theories. Our results show that emotional messages have no effect on buyer surplus, further that negative emotional messages tended to slow down time to task completion. In addition, we found that attempts to communicate price messages had no effect on performance supporting previous theories.

Keywords: Buying platforms, Coordination, Electronic market design, Experimental economics, Group buying, Information overload, Social buying, Task complexity.

INTRODUCTION

Social buying, or group-buying, key element relies on the ability of individuals to communicate information to other members and dynamically form groups, thereby coordinating activity to generate bids, and is an important an emerging aspect of research in social commerce (Liang and Turban, 2012). Industry examples of group-buying businesses include early ventures like Mercata, which ceased operation by 2004, as well as more recent ones like Living Social and Groupon. Predicting future behaviors of members in the group are predicated on understanding the emotions and feelings of individual buyers and in turn their feelings toward each other and the respective task. This study focuses on the content of intra-group messages between buyers conducted in a group buying experiment.

From a theoretical perspective, the study is motivated by research on IT-enabled coordination, viewing social communication on group-buying platforms as a new form of an IT-enabled coordination mechanism. Research on bidding auctions, economic based electronic transactions and consumer behavior is fairly abundant, including the focus on attitudes of online purchasing by individual consumers as an effect on intention to return or intention to purchase (Bellman, *et al.* 1999; Koufaris, 2002). Understanding the effect of consumers' communication with other buyers provides deep insight into tasks that are conducted on

various forms of electronic commerce where the tasks are considered interdependent, most notably group buying.

Traditionally, economic theory has sought to understand, and predict unbalanced economic power and its effect on behaviors and markets. Galbraith's theory of countervailing power (1952) seeks to explain a mechanism by which groups, or consortiums, not individual consumers, can respond to unbalanced economic power. However, the technological advances in recent years, through increased communication, have made the possibility of countervailing power possible through group buying electronic markets (Rha and Widdows, 2002). Countervailing power theory explains the evolution of countervailing power as a condition in which the existence of strong buyers would evolve as a response to aggregation of power by sellers, and furthermore that this evolution would "occur not in lockstep but as a response to the other" (Galbraith, 1952). Unfortunately, due to the enormous costs of coordination and communication and the complexity these attributes create, it was not envisioned, at the time, to be possible at the level of individual consumers.

At various times, theories from economics and psychology appear to be at odds, with respect to the value of emotions in economics. Principally, economic literature has been dominated by rational choice theory. Khaneman and Tversky (1979) first explored cognitive elements of economic decision making using a psychological perspective. Khaneman's line of research in this, and related areas, would later win him the Nobel Prize in Economics. Rabin (1998) states that by ignoring behavioral traits in the economic literature focuses which primarily seem to focus on "logic and precision" could be due to institutional complacency and thus may be detrimental to the research in the field. Others argued that using cognitive aspects of psychology for economic research does not extend the literature enough, and thus argue for more analysis and research studying emotional effects. Elster (1998) stated that more work in emotion theory should be performed to answer questions such as "How can emotions help us explain behavior for which good explanations seem to be lacking".

This paper analyzes the messages conducted from the three previous experimental sessions, in which a group buying experiment was conducted with communication mechanisms. In sessions where buyers were given a channel for communication with other buyers, messages were collected and analyzed to examine the type of messages such as price messages or emotional messages. With the availability of the rich message data, this study examined the message counts, and content to ascertain any emerging patterns exhibited among the individuals vying to form a group. With this data, patterns such as the disclosure of private information, and negotiation, may provide insight into how the groups will perform both at an economic performance level as well as time to task completion task level.

THEORETICAL PERSPECTIVE AND HYPOTHESIS DEVELOPMENT

Economics of Group Buying

Group buying sites such as Mercata and Groupon have sought to capitalize on economic theories that relied on the belief that consumers would engage in coordination activities to obtain better deals. The core aspect of *Social buying*, or group-buying, rests in the ability of groups to dynamically form, and communicate information, to other buyers thereby coordinating their activity through the creation of a collective bid. This concept has become more important in economic literature and is an emerging aspect of social commerce (Liang and Turban, 2012). Coordination between consumers depends on the ability of consumers to communicate various information points to other buyers either directly through messages or through some other mechanism that controls the coordination process. The emotions and feelings of individual buyers can provide greater insight in understanding and predicting future behaviors of these consumers. The abundance of consumer behavior and economically based research of online activities supports the notion of further examining more intricate behaviors and characteristics of online buying. As

an example, prior research focused on the attitudes toward online purchasing as an effect on intention to return or intention to purchase (Bellman, et al. 1999; Koufaris, 2002). These attitudes can have a significant effect in the consumers' behavior and outcome.

Countervailing Power Theory

Countervailing Power Theory states that unbalanced economic power can be "held in check by the countervailing power of those who are subject to it" (Galbraith, 1952). The theory explains the condition in which the existence of strong buyers would evolve as a response to aggregation of power by sellers, and furthermore that this evolution would "occur not in lockstep but as a response to the other" (Galbraith, 1952). One key limitation to the theory recognized by Galbraith was the inability of consumers to exercise countervailing power even though it was conceivably possible (Galbraith, 1952; Rha and Widdows 2002). It was viewed at the time that countervailing power could only be exercised by the introduction of intermediaries, such as wholesalers and retailers, since they had more organizational capability. Thus it was viewed that consumers would be unable to exercise any form of countervailing power, because of the communication and coordination costs.

Rha and Widdows (2002) had found that consumers in the early 1990's organized to drive down prices of heating fuel in Philadelphia, Pennsylvania through the formation of the Public Interest Research Group (PIRG) for Fuel Buying. Attaining critical mass of consumers proved to be the key challenge for the group, which further brought into question of how broadly the concept of countervailing power, theoretical or practical, could be applied. Consumers therefore, in order to be successful in exercising countervailing power, would need to be better organized and would thus require a more simplified communication mechanism. The complexity and variety of communication possibilities that needed to be transmitted and interpreted proved to be the most significant challenge in coordination.

Interdependence

Interdependence theory relies on the notion that group members are made interdependent through the establishment and achievement of goals (Johnson and Johnson, 2005). It analyzes the structure of the goals of participants in a situation determines how they interact and the patterns of interaction determine the situational outcomes (Deutsch, 1949, Johnson and Johnson, 2005). The type of interdependence toward individual and collective goals are specified through the goal structures that are employed, and the interaction between the interdependent parties can promote or obstruct the goals of others (Johnson and Johnson, 2005). Interdependence theory is characterized through a number of dimensions including level of dependence, mutuality of dependence, basis of dependence, covariation of interests and information sharing (Rusbult and VanLange, 2002)

This research is focused on communication messages between buyers, and thus the last dimension is critical. *Information sharing* between members of the group can greatly impact the level and nature of interaction (Rusbult and VanLange, 2002). In the presence of incomplete information, an environment of uncertainty and misunderstanding is created leading to interaction difficulties (Kelly et al. 2002). Participants may have difficulty or be unable to interact team members, in this case a group buying environment, and thus this difficulty could prove detrimental to outcomes.

Interdependence theory provides this research with a theoretical basis for the combination of social interaction among group members through a specific interdependent task. Group buying represents an activity that higher along the interdependent dimensions, specifically the information sharing dimension, thereby requiring higher levels of interdependence.

Emotional Messages

Emotions are relatively short-lived, positive or negative, evaluative states that have neurological and cognitive elements (Lawler and Thye, 1999). Social exchange theory (Homans, 1958), assumes self-interested actors will transact with other actors to accomplish goals they cannot achieve by themselves. Social exchange researchers have examined the role of emotions in the social process. A central component of social exchange process are interdependent tasks (Lawler and Thye, 1999). Evidence that suggests that emotions “enter and pervade the social exchange process”, and emotions serve as a signaling function for group members within the process and thus bias how group members perceive each other, thereby impacting interaction among members and affecting decision making (Lawler and Thye, 1999).

Emotions act as signaling function that communicate evaluations and appraisals (Parkinson, 1996). Through appraisal theory (Lazarus, 1991), buyer’s appraisal of situations effects buyer’s emotions, which could be conveyed through messages, which, in turn, affect other buyers, impacting their interaction. Buyers in a group-buying auction engage in joint activities, which heighten the sense of the collective, and this activity strengthens social solidarity through shared emotions and feelings (Lawler and Thye, 1999). Thus stronger group attachment could be a result of positive feelings (Lawler and Thye, 1999).

Some have argued that computer mediated communication (CMC) cannot convey emotions. CMC suppresses social cues and is a more impersonal medium (Sproull and Kiesler, 1986). Media richness theory (Deft and Lengel, 1986) provides for the differences in information processing between the different types of technology based on a scale of richness, i.e. the ability of the technology to convey information to change understanding in a given time period. It is possible therefore that information can convey emotions. Derks et al. (2007) argue that “emotions are found frequently online as offline”, and users of CMC find different ways to express emotion through the technology more explicitly to compensate for the lack of normal face-to-face emotional cues. Media synchronicity theory further states that users utilize various symbol sets in order to convey information necessary (Dennis et al., 2008). We find many examples of this such as emoticons and initialisms.

Impact of Media on Groups

Rha and Widdows (2002) explained the importance of organization and communication for countervailing power. Internet and related technologies can facilitate socialization and allow people with similar interests and shared values to form virtual communities (Chiua, et al. 2006). Communication is facilitated by technology and these technologies enhance opportunities to organize. However, does technology enhance the collaborative effect necessary for collective buying, and further will the price be affected positively in favor of the buyers? The Theory of Task, Technology and Fit (TTF) (Goodhue and Thompson, 1995) holds if the capability of the IT matches the tasks the user performs, the technology is more likely to have a positive impact on individual performance. In a group decision task, Zigurs and Buckland (1998) examined TTF, and focused on the tasks performed by individuals. Understanding the task definition is critical in determining the best fit for a group decision support system or any group related task. Zigurs and Buckland (1998) adapted the aggregated task categories and dimensions for determining the best fit of technology in a group setting.

Under the categories set forth by Zigurs and Buckland (1998), the collaborative buying scheme would be defined as a simple task, since the outcome and solution scheme are singular, resulting in no conflicting interdependence. Simple tasks would therefore be mapped, according to Zigurs and Buckland (1998), to technology that is high in communication support, low in process structuring and low in information processing.

In addition to understanding the fit of technology to the particular task, assessment of the attributes of technologies is necessary to find how simple tasks can be facilitate for activities such as collective buying. Media Synchronicity Theory (Dennis, et al. 2008) helps identify technologies best suited for particular tasks. MST provides a framework for two types of processes, conveyance and convergence. Conveyance processes transmit a diversity of new information in a manner that enables the receiver to mentally understand the situation being presented (Dennis et. al 2008). It usually involves more cognitive and information processing. In contrast, convergence processes require less information processing and more information transmission. In convergence processes, individuals require less cognitive processing and have a better and more complete understanding of the situation to reach a decision. Less deliberation is required in convergence processes, therefore in situations where individuals share an understanding, familiar information encoding and decoding should be accomplished more expeditiously (Minsky 1986).

MST provides a foundation for the assessment of technological features used in convergence and conveyance processes and is central to this research. Media lower in synchronicity is better for convergence processes, while media that is higher in synchronicity is better for conveyance processes. The effect, therefore, of different attributes of media and its effects on performance in a collective buying setting provides the foundation for the experiment in this research.

Although the primary set of tasks are considered simple, and the set of technologies attributes could be aligned with convergence processes, we anticipate that the process will transition from conveyance to convergence, i.e. buyers new to the collective buying will need more time to adapt to the buying process and thus will spend time exploring the technology to determine its function and how the user will interact with the technology. Initially, the actual task is more “judgmental” rather than simple (Zigurs and Buckland, 1998) where the outcome and solution scheme are singular, but contain some occurrence of conflicting interdependence. Thus more information processing would be required, which, in turn, would require technology attributes more fitting for a conveyance process. Over time, the level of information processing would fall, as the experience of collective buying becomes more entrenched in the buyers, and therefore, buyers would tend toward technologies that are more appropriate for convergence processes.

Communication Messages in Economics

Many researchers have tried to determine if the Hayek hypothesis (1945) actually holds, whereby the price contains all the information necessary for equilibrium, and many experiments have been conducted to validate this effect (Smith, 1989). Galbraith (1952) believed that communication was necessary to counter seller market power. However, it is only recently that consumers have had the ability to communicate effectively, primarily due to the Internet and related technologies. (Rha and Widdows, 2002). When buyers communicate through internet mechanisms, researchers are not certain exactly what types of messages or frequency of messages they might choose. Emotions, and thus emotional messages, for example, can bias decision-making (Lerner & Keltner 2001), and types of emotions, i.e. positive or negative, have been shown to lead to optimism or pessimism in decision-making (Isen, et al., 1978; Johnson & Tversky, 1983).

The internet could act as a change agent for countervailing power, even though Galbraith (1952) posited that individual consumers could not coordinate effectively. Consumers can exchange information, and through information influence, it can effect behavioral buying patterns, or behavior willingness (Park & Lessing, 1977; Ajzen & Fishbein, 1980) Communication between consumers can lead to normative influences, such as conformity (Allen, 1965) and herd behavior (Deutsch & Gerard, 1955). All different types of messages, emotional, and coordination can effect the buyer’s outcome. In this research though, we specifically focus on the emotional messages and the effect on buyers’ outcomes as well as coordination messages between buyers.

Hypothesis Development

This study examines the message content and its relation to buyer performance in terms of successful task completion and buyer profit. Thus, the study is partitioned into two types of communication patterns, emotional (positive/negative), and coordination (price) based. The literature review found that emotions play a significant role in joint activities and further that positive emotions have a strong moderating effect on performance (Lawler and Thye, 1999). Emotional messages are therefore believed can be conveyed through communications (Derks et al. 2007) and these messages will serve to signal intentions. If messages are positive the performance of the group should increase, and thus buyer profit should increase while time to task completion should decrease, i.e. faster successful bids, and the reverse will hold true for negative emotions. Thus the following exploratory hypotheses are developed:

Hypothesis 1 (Positive Messages—Buyer-Surplus Hypothesis):

Increased levels of positive messages will tend to increase buyer surplus.

Hypothesis 2 (Positive Messages—Task- Completion Hypothesis):

Increased levels of positive messages will tend to expedite successful group task completion.

Hypothesis 3 (Negative Messages—Buyer-Surplus Hypothesis):

Increased levels of negative messages will tend to decrease buyer surplus.

Hypothesis 4 (Negative Messages—Task-Completion Hypothesis):

Increased levels of negative messages will tend to delay successful group task completion.

Hayek (1945) noted that price contains all the information necessary for efficient markets. However, Galbraith (1952) believed that if consumers could exchange information and coordinate, they could exercise countervailing power. Previous studies focused on the effect of enabling communication in relation to buyer performance (Pelaez, et al. 2012). This notion is extended to actual messages that contain price, price communications, to determine if there is an effect based on increased “directed” or utility oriented messages, i.e. eliminating the noise from spurious messages that have no bearing on the actual task. Using only price messages as an independent variable, this study examines if these types of messages increase, buyer performance will increase, measured by higher buyer profits and faster time to task completion. Therefore, the following exploratory hypotheses are developed.

Hypothesis 5 (Price Messages—Buyer-Surplus Hypothesis):

Increased levels of price messages will tend to increase buyer surplus.

Hypothesis 6 (Price Messages—Task-Completion Hypothesis):

Increased levels of price messages will tend to expedite successful group task completion.

METHODOLOGY

Experimental Design

Using a specific variant of the buyer-initiated intra-auction group-buying model proposed by Chen et al. (Chen et al., 2009), an electronic market experiment was created in the laboratory where participants were asked to coordinate group purchases of a single product from a monopolistic seller. Each individual buyer has a private, pre-assigned value for the same single product. Consumer valuations vary across buyers and each buyer needs to buy one unit of the product. The experimental environment was developed using the Z-tree software (Fischbacher, 2007) and was implemented in a Windows client-

server networked environment. Participants were recruited from an undergraduate student subject pool and were compensated with course credit.

The experiment was conducted over a period of two years from multiple designs of the experiment. Each experiment had similar attributes including the presence or absence of a communication channel, and group size of 2, 3, or 4, as a measure of social facilitation, and time pressure, induced by limiting the auctions to two-and-a-half minutes, or three-and-a-half minutes. These time limits were determined after a number of pilot runs that had already been conducted. This time window was sufficient for groups to complete given tasks but limited to induce pressures to make decisions quickly.

Procedure

Each session consisted of groups with 2, 4, 5, or 8 prospective buyers. Upon entering the lab, the participants were randomly assigned to computer terminals with a buyer screen for the buyers. Once the participants were seated, they were asked to review a set of instructions explaining the electronic group-buying mechanism and the user interface for their specific role as a buyer. Participants were not told who were buyers or sellers. However, the moderator of the experiment indicated to each participant that they would be given a set of instructions based on their role as either a buyer or seller, even though ultimately, everyone was a buyer. The session consisted of one extended practice period and ten experimental periods, where buyers worked to coordinate group offers to the seller. The data from the practice round was discarded and not used in analysis. Each regular round lasted 150 seconds, two and a half minutes, or 210 seconds, three and a half minutes.

In the sessions with 2, 4, and 8 buyers, the seller was a participant; however, in the sessions with 5 buyers, the seller was automated. Since the analysis of this study was on the messages generated by the buyers, the seller function was not relevant for this study. In the automated session, if the bid price matched or exceeded the seller price, the bid was accepted and the buyers won the auction at the price of the bid. If the bid was below the "acceptable selling price", the offer was rejected, and buyers could work on a new, improved joint offer.

The buyer screen shows the buyers assigned willingness-to-pay (WTP) value of the product they are asked to buy. With the beginning of each round, a buyer can initiate a bid, or wait and join an existing bid price. When the requisite number of buyers, determined by the group size manipulation, a group offer was generated and immediately forwarded to the seller for review. In any case, a new bid price could be proposed at any time. Buyers observe the market by looking at the current bids, pending offers, and also by learning from declined offers. When a transaction occurs, i.e. a seller accepts an offer from the buyer group; the buyer's profit will be calculated and shown to the participants. In the treatment with a private communication channel buyers were able to exchange text messages via an instant message type of communication box. These messages become the primary focus of the study.

In each period of the ten repeated rounds of the experiment, the buyers were given different WTP values, generated randomly, and rotated to buyers sequentially in each period (as detailed in Appendix). First, 10 random integer numbers are generated between 25 and 100 from a uniform distribution. These 10 numbers are then recorded and reused for all of the 10 repeated rounds for all experimental groups in order to experimentally control for WTP effects. In the first round of the experiment, the first five numbers are assigned to the five group buyers sequentially, and in the second round, the next five values, starting from the second number, are assigned to the buyers sequentially, and so on. This WTP rotation method ensures that every buyer receives all of the ten generated values over the course of the ten repeated rounds and, additionally, that for any given round all buyers have also different values.

Measures

Specifically, this study looks at all experimental sessions in which, one experimental treatment variable, the presence of the communication channel was provided. Dependent variables include the number of price messages, the number of positive messages and the number of negative messages, while independent variables include group-level profit, measured as average buyer profit within groups, and group performance, investigated in terms of time for group task completion. The group task is measured, making a deal with the seller, by analyzing the time the successful bid was been accepted. See Table 1 for the variables used in the experiment.

Table 1. Experimental Variables

Variable Category	Variables
Independent Variables	<ul style="list-style-type: none"> • Message Counts • Positive Messages • Negative Messages • Pricing Messages
Dependent Variables	<ul style="list-style-type: none"> • Buyer profit • Task completion (accepted bid)
Control Variables	<ul style="list-style-type: none"> • Time pressure • Experimental periods (P1, P2, ..., P10 = 0 or 1) • Experimental Session

DATA ANALYSIS

Descriptive analysis

The experiment was carried out with a total of 97 groups. Groups were comprised of 2, 4, 5, and 8 potential buyers. Buyers would be allowed to place a bid on a product, if the requisite number of buyers agreeing on a price is met. Bids could be placed with 2, 3 or 4 buyers. Data was collected from each group over 10 rounds of the collective bidding. Out of the 970 rounds over the 97 groups, 48 groups were provided with a communication channel in which to send messages to other bidders.

2123 messages were collected over the 480 rounds of bidding from 209 bidders, for an average of 10.15 messages per buyer. Table 2 shows the number of messages by bidder group size.

Table 2. Message Count Descriptive Statistics

Bidder Group Size	2	3	4	Total
Groups with Communication (Total Groups)	21 (40)	11 (21)	16 (36)	48 (97)
Dependent Variables	58	55	96	209
Control Variables	397	590	1,136	2,123

Emotional Messages

The analysis of the message content focused on emotional messages, i.e. positive or negative, and utility messages, those dealing with price. Two independent raters, graduate students, were given the list of messages and asked to rate each message as a positive message or a negative message, with respect to emotion. Sample messages are provided in Table 3 below.

Table 3. Examples of Emotional Messages

	Positive	Negative
1	hey okay	low ball
2	lets keep it up lol	damn you sellers
3	Good start	okdont bid now. anyone
4	wtf? lol	We have to work together!
5	lol	okdont bid now. anyone
6	lmao	theyre money hungry
7	prob loll	ihate 16
8	haha	we're going to lose money
9	ha	DONT CHILL!
10	17 looks beautifull seller :)	let's not buy anything next round

After the raters conducted their analysis, Cohen's Kappa was calculated to examine the interrater reliability for the positive and negative messages. As shown in Table 4, the interrater reliability for positive messages was .73, and the reliability measure for negative messages was .70, both of which are interpreted as "good agreement" according to the rating scale Kappa. Once agreement was determined, the following table summarizes the results.

With the combined messages, the goal was to determine the effect of any on average profit, or time to completion. First, two ANOVA analyses were conducted to see if there were any differences between the different group sizes, and the average number of positive or negative messages per buyer in each group (2, 3, 4). The ANOVA analysis found no differences between the groups for average positive ($F=2.76$, $p=.121$) or average negative messages ($F=.04$, $p=.976$).

Table 4. Summary Statistics of Emotional Messages

	Coder 1	Coder 2	Combined Agreement	Reliability
Positive	111	119	86	.73
Negative	284	328	227	.70

Using a regression analysis, an examination was conducted to see if the average positive or negative messages per buyer impacted Average Profit, or Time to Completion. The regression analysis included the control for the group size. The two regression models are shown below in Table 5.

Table 5. Regression Models

	Profit	TTC		Profit	TTC
Intercept	43.96†	144.33**	Intercept	61.70**	114.62**
Groupsize3	1.155	-44.98	Groupsize3	11.64	-36.49
Groupsize4	-17.56	12.48	Groupsize4	-12.80	11.80
Positive	4.70	.46	Negative	-3.88	8.5*
<i>F</i>	.899	1.526	<i>F</i>	1.427	4.98**
Adj R ²	.000	.090	Adj R ²	.005	.314
Normality (S-W)	.86	.86	Normality (S-W)	.70	.70

** $p < .01$, * $p < .05$, † $p < .10$

The regression analysis shows no relationship between the positive messages and average profit or time to completion. Thus no evidence of a relationship as suggested by H1 and H2 was found. While negative messages appear to have no impact on Average Profit, providing no evidence for H3, there does appear to be a significant positive effect between negative messages and time to completion ($t = 2.61$, $p = .015$), providing some evidence of a relationship as described in H4. This appears to show that the higher the average number of negative messages per buyer, the longer it takes to reach a successful group bid, controlling for the groups size had no effect. Negative messages, thus, have an adverse effect on group performance, as Lawler and Thye (1999) explained.

Price Messages

Continuing to analyze the messages, focus shifted to price messages. As an economic experiment, it is expected that group bidders might communicate information about prices, or their private values, in an attempt to coordinate a purchase prices. Analysis on the messages was first done automatically to remove any messages that did not contain a number. Of the 2,123 messages, 947 messages contained numbers. After careful review by the principal researcher, it was found that some of the messages with numbers contained acronyms commonly used in internet chat forums such as “b4”, meaning “before”, or “I h8 this”, meaning “I hate this”. Each of the messages was reviewed and 63 additional messages were removed for containing acronyms, common Internet terms containing a number, or only referencing a buyer, such as “waiting for buyer 1”, and not a price. If a message contained anything that could be understood as a price, it was kept. Table 6 shows the breakdown of these messages.

As the table shows, almost 42% of all the messages dealt with price, and thus represents attempts at coordination of task completion as required for this type of interdependence task. How these price messages and attempts at coordination impact average buyer profit and time to task completion represents the central piece for this study. A regression model was built to determine the effect of these price messages base on the average number of price messages sent per buyer. Additionally, one control

Table 6. Summary of Price Messages

	Summary
Total Messages	2,123
Total Numeric Messages	947
Messages manually removed	63
Total Price Messages	884
Ratio of Price Messages to Total Messages	.416
Ratio of Price Messages to Numeric Messages	.933

was added, group size, since the study had sessions with 2, 3, and 4 as the buyer group size. The results of the regression are compiled in Table 7.

From an average buyer profit perspective, the regression shows that the number of price messages per buyer has no effect on the average profit level ($F = 2.045, p = .12$). However, when profit is examined, the results show a strong positive effect, between an increased number of messages, and an increase in time to completion. Thus no evidence of a relationship described in H5 and H6 was found. The results did suggest an opposite effect of what EH6 described ($p < .05$). However, controlling for the group size may provide some insight to this result. The manipulation, in which the buyer group size was set at three, was the only study that had 210 seconds as the time duration, whereas the others were 150 seconds. It is most likely that this result would be primarily due to the increased time duration. In order to test this, we examined the data without this session, and a regression was run between the price messages per buyer and time to completion. The result yielded a model that had no significance ($F = 2.652, p = .113$). Hypothesis tests are summarized as Table 8.

Table 7. Regression Modeling

	Model 1		Model 2
	Profit	Time	Time
Intercept	47.54**	123.32**	116.46**
Groupsize3	17.14	-72.18**	
Groupsize4	-14.64	-4.55	
PriceMsgs	.38	2.93**	1.712
<i>F</i>	2.045	8.79**	2.652
Adj R2	.082	.40	.046

** $p < .01$

Table 8. Summary of Hypotheses

		Hypothesis	Evidence
Positive Emotional Message Effects	EH1	(Positive Messages—Buyer-Surplus Hypothesis): Increased positive messages will tend to increase buyer surplus	No
	EH2	(Positive Messages—Time to Task Completion Hypothesis): Increased positive messages will tend to speed up Time to Task Completion	No
Negative Emotional Message Effects	EH3	(Negative Messages—Buyer-Surplus Hypothesis): Increased negative messages will tend to decrease buyer surplus.	No
	EH4	(Negative Messages—Time to Task Completion Hypothesis): Increased negative messages will tend to delay time to task completion.	Yes
Price Message Effects	EH5	(Price Messages—Buyer-Surplus Hypothesis): Increased price messages will tend to increase buyer surplus.	No
	EH6	(Price Messages—Time to Task Completion Hypothesis): Increased price messages will tend to speed up time to task completion.	No

DISCUSSION AND LIMITATIONS

The study combines experimental economics, information systems, emotion theory and social exchange theory. The study examines the effects of emotional messages and utility messages in the form of price messages and derived 6 hypotheses, based on the literature.

While the literature stated that emotional messages should have an effect on group performance, generally this was not shown to be true. However, there was a significant effect of negative messages on successful task time completion. The implication of this is that negative messages may create more hostility and anger toward the group thereby suppressing group performance in terms of time to task completion, this aligns with the probability of interaction difficulties in the presence of negative messages. This does support the literature review, in the sense that as positive messages were posited to increase the social exchange process, negative messages should hinder that process, which appears to be the case.

It should be noted that although the messages were deemed as positive or negative, Parkinson (1996) provides taxonomy of emotions and that simply looking at messages in a positive or negative context may not be enough since emotions are much broader than the two dichotomous categories used in this study. Additionally, future studies should include scales during the sessions to determine the emotions of the participants, which could then be analyzed within the context of the session and compared to the performance results. In addition, surveys conducted at the end can serve to validate the overall emotional state of the participants to determine the effect on overall performance, which could then be compared to the message content.

Price messages were thought to have some importance on performance, since Hayek (1945) noted that price itself contains all the information necessary, it was believed that there might be a relationship between performance and messages between buyers that contained price. Galbraith suggested that this increased communication should aid in coordination yielding better prices. However, this was not the case, and therefore, future studies should focus on the overall effect of possibility that price messages might have more of an impact in different ways in electronic markets. Future studies might try to explore the difference between price messages and a price mechanism.

This study contributes to the emotional and behavioral economic literature and through the results, advocates more studies in these messages. The results suggest that emotions might play a role, however, not on price. It is not very clear how strong of an effect they have on the task itself, and manipulating various elements of this study could provide more insightful results. Organizations that utilize social commerce can monitor emotions of participants and thus alter their design according to the results of these types of studies, specifically from this study, attempting to mitigate negative emotions. While generally it is believed that emotions play a role, it may be more important to mitigate the negative emotions. Future research might hold that emotions such as anger, happiness and sadness might be more predictive of buyer performance and thus should be studied in this context.

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APPENDIX A
Experimental Screens for Study 1 and Study 2

Figure A1. Seller Screen

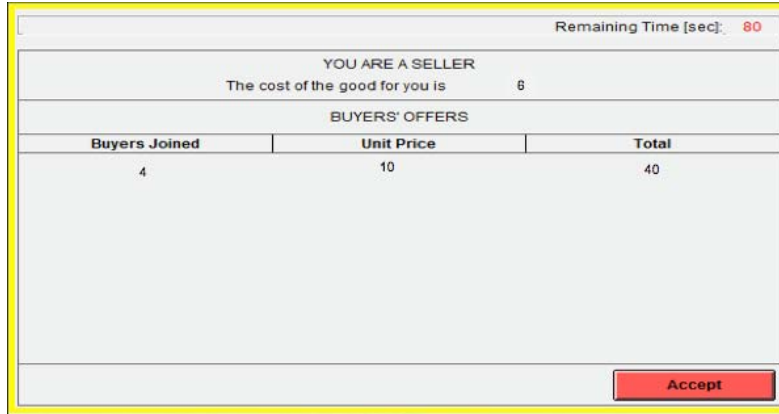


Figure A2. Buyer Screen without Communication Box

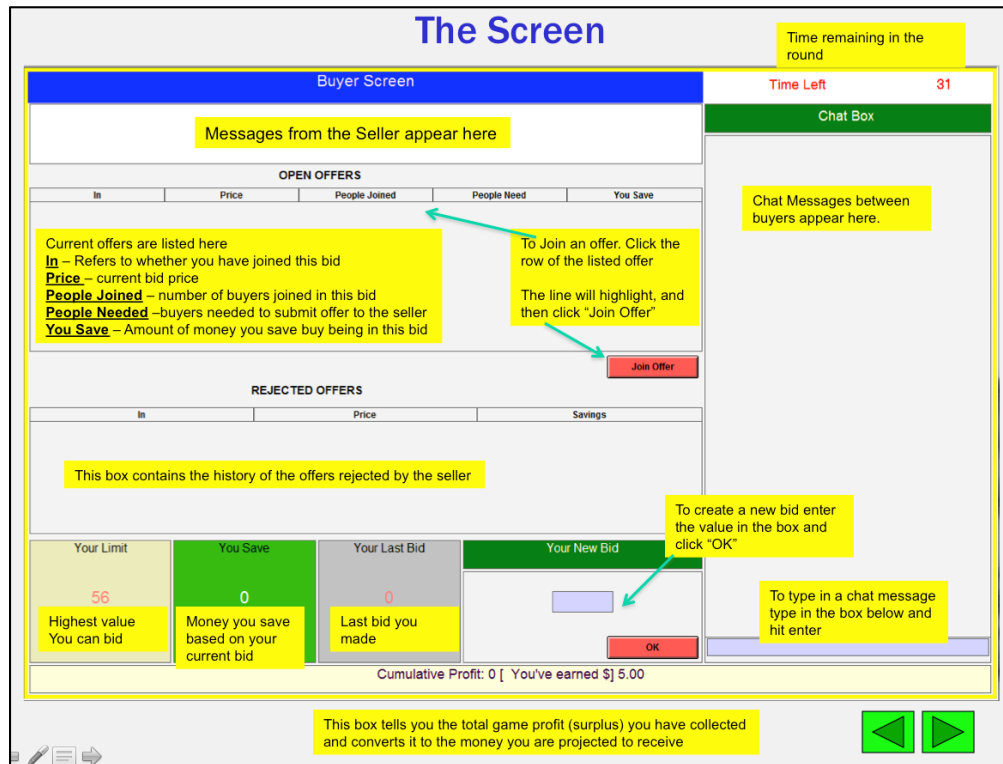


Figure A3. Buyer Screen with Communication Box



APPENDIX B

Experimental Screen for Buyers in Study 3



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