

Association for Information Systems

AIS Electronic Library (AISeL)

ICEB 2003 Proceedings

International Conference on Electronic Business
(ICEB)

Winter 12-9-2003

The Subjective Value of Information: Trading expertise vs. content, copies vs. originals in E-Business

Sheizaf Rafaeli

Daphne R. Raban

Follow this and additional works at: <https://aisel.aisnet.org/iceb2003>

This material is brought to you by the International Conference on Electronic Business (ICEB) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICEB 2003 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

The Subjective Value of Information: Trading expertise vs. content, copies vs. originals in E-Business

Sheizaf Rafaeli and Daphne R. Raban
Center for Study of the Information Society
Graduate School of Business
University of Haifa
Mount Carmel, Haifa 31905
Israel
Tel: +972-4-8249578
Fax: +972-4-8249194
sheizaf@rafaeli.net

Abstract

What is the subjective value assigned to information? Is the subjective value of information similar to the realistic or normative value, or are there deviations introduced by human processing, the framing of the information source, or the external qualities of packaging and ownership of the information? Do people assess information as having the same value when offered the chance to sell it (Willingness to Accept, WTA) as when facing the need to buy it (Willingness to Purchase, WTP)? This is an empirical, experimental investigation of the effects of expertise vs. content, and copy vs. exclusive original packaging of information on the WTA/WTP ratio. In an animated computer simulation of a business game players maximize their profits by making choices regarding inventory and prices. Participants were also offered the chance to bid in trade (buy or sell) information regarding the weather that may affect demand. We find, as hypothesized, that the subjective value of information does indeed follow the predictions of Endowment Effect theory. Participants revealed a ratio of Willingness to Accept to Willingness to Purchase (WTA/WTP) that resembles the ratio common in the case of private goods. In the decisions, choices and performance recorded for the 294 subjects, we also found support for the hypothesis that the WTA/WTP diverges from unity more often and in a more pronounced manner for information traded in the "original" form rather than as a copy of the original, although even for copies the WTA/WTP ratio is still double. Results yield a value of about three for the WTA/WTP ratio for original information regardless of whether the source is content or expertise. Valuations of content and expertise did not diverge. However, the source of information can be manipulated by system design to become more salient. Copy information received a subjective value which was significantly different (lower) than original information. Implications for both online trading and online sharing of information are discussed.

1. Introduction

One of the central subjects of trading in e-business is information itself. E-business thrives on both the availability and the exchange of information in various forms. Every commercial transaction involves transfer of information. Commercial transactions usually involve not just the item being traded (books, CDs, antiques etc.) but accompanying information as well. Information is a unique good since use and access rights are often transferred by copying without the transfer of exclusive ownership rights. Similarly, expertise is transferred by copying since it does not leave the expert's mind. An exception may be when an expert provides exclusive advice and will not share or sell it again. Information and expertise can be transferred both by sharing (advice giving) and by trading. Since information exchange has become an integral part of e-business, the value of information must be part of the total transaction value estimate. Lack of sufficient information creates uncertainty which in turn leads to under trading of the goods traded. Hence, information is a catalyst to economic activity.

So far information was discussed in the general sense of the word. Some definitions are in order before proceeding. Three closely-related concepts are defined: Data, information, knowledge. Different definitions can be found in the literature for these terms from an information systems perspective [1, 2] or from an economic perspective [3-5]. The definitions used here were adopted from the knowledge management literature [6]. While more complex and detailed definitions are available (for example, [7]), the following definitions have been selected because they are fairly simple and parsimonious and enable operationalization. Data are discrete, objective facts about events. Information is analyzed and/or contextualized data. Information carries a message and makes a difference as perceived by the receiver. Knowledge or expertise is a human quality that builds on data and information together with experience, values, and insight. In this study we focus on two

instantiations of information: information as content and information as expertise. Content is the more tangible of the two.

The value of information is enigmatic. Information is neither a private nor a public good. It is an experience good. The main focus of this paper is to offer a way to assess the value of information as content and expertise.

The present research proposes to investigate the subjective value of information and expertise by combining economic and psychological theory with information systems research. We use an experimental/simulation approach to suggest possible approaches to evaluating the intangible, subjective value of information.

2. The Value of Information

Several unique characteristics render information difficult to value. Information is an unusual good in many aspects - production, distribution, cost, and consumption. Information is both an end-product and an input into the production of other goods, decisions, or information. It often accompanies market goods as an integral part. For example, an increasing portion of all consumer goods are accompanied by user manuals. Our purchasing decision may also be based on the availability of expert advice and recommendation.

Information is expensive to produce and cheap to reproduce [3, 4]. In fact, distribution is accomplished mainly by reproduction or copying. The same content can be distributed by different media, and the price is often derived from the medium rather than from the value delivered by the content itself. In point of fact, people consume information both by sharing and by purchasing, while most other goods are consumed mostly by purchasing. The cost of information can be either direct or indirect. The quest for the value of information is further complicated by the fact that information is an experience good, meaning that its value is revealed only after consumption [4, 8].

The value of information can influence the value of objects of commerce, therefore, we set out to investigate the value of information and expertise as a first step of a broader question relating to the influence of the availability of information on trading market goods.

Theoretically, there are three ways to assess the value of information [1, 9]: Normative, realistic, and subjective. While user utility should be the base for calculating the price of information, utility varies by person and circumstance. Realistic methods are *ex post* and consequently inappropriate for evaluating information content (also referred to as the “inspection paradox”) [8]. We therefore focus on the subjective value of information.

The tradition of studying decision-making under uncertainty has addressed patterns of information use and the value assigned to information. This literature sets the

backdrop for understanding information business trends. The heuristics experiments [10] as well as later studies [11] demonstrated that people tend to ignore available information such as prior probabilities, sample size and the like. Instead, decisions are based on other subjective methods such as representativeness, availability, and adjustment and anchoring (also known collectively as heuristics). Earlier experiments have also shown that people tend to be conservative and undervalue information available for the revision of a prior opinion [12]. A recent study [13] tested the pursuit of information for daily decisions. Participants preferred to seek information and to base their choices on (objectively) noninstrumental information. In other words, people assigned positive subjective value to objectively worthless information. Theory also suggests that people seek information because it seems the right thing to do [14], implying over-demand for information and a high subjective value. People tend to accumulate information “just in case” they may need it in the future, again leading to excessive demand [8]. The theoretical tension is, therefore, between studies indicating that information is under-valued and research showing that information to be over-valued.

2.1 The Endowment Effect

Subjective value has been studied experimentally for many types of market goods (also called private goods) and nonmarket goods (also called public goods). One very interesting finding of experimental research on subjective value is the discovery of a disparity between the highest amount one is willing to pay (WTP) for a good and the lowest amount one is willing to accept (WTA) as compensation for giving up the same good. This disparity was coined as the Endowment Effect (EE) [15, 16]. Traditional economic assumptions imply that, when income effects are eliminated, the difference between WTP and WTA should be negligible (the difference should amount to the decreasing marginal utility). However, experiments with various types of goods have shown that WTA is significantly greater than WTP. By definition, WTA and WTP values are neither normative nor realistic. Instead, they are subjective values, since they represent an individual’s personal perception of an object’s worth for him or herself. The EE methodology itself is designed with the purpose of eliciting submissions of private values and is described in section 3.2 below. We apply the WTA/WTP methodology as used for various types of goods in order to investigate the subjective value of information with a view to determining what characterizes information as a good.

2.2 The WTA/WTP Disparity

The consistent, unexpectedly large and uni-directional difference between WTA and WTP observed in relation to traditional goods and services has generated much research interest. Attempts were made to explore whether the discrepancy can be explained by economic theory or

whether the difference belongs to the realm of less than- or bounded- rational choice and is rooted in psychological origins. We will summarize some of the pertinent literature on the WTA/WTP disparity and the explanations offered by economists and psychologists highlighting the common denominators of these two approaches.

Commonly, bidding is employed as the general experimental approach for researching the values of WTA and WTP. Participants in experiments are offered the opportunity to bid for the purchase of an item, or to state a reserve price for the sale of an item. There are many bidding mechanisms and there is no specific experimental design common to all the experiments described below. A comprehensive methodological review detailing the types of bids used in different papers can be found in [17]. Using the various bidding mechanisms, researchers have demonstrated a significant disparity to exist between the values of WTA and WTP for common market goods such as chocolates, pens, and mugs [18, 19], and a much larger disparity with regard to nonmarket goods such as health [15, 20]. Trading induced-value tickets, or tokens of known value, have not shown a WTA/WTP disparity [18, 21, 22]. Induced value tickets or tokens are characterized by having only pure monetary value. In this case, of “induced value” items, the expected number of trades took place, the expected number of trades being half of all possible trades. Herein lies one of the important implications of the disparity, namely that the existence of a significant difference between WTA and WTP leads to a reluctance to trade and results in undertrading. This was further confirmed by trading induced-value tickets of unknown value [21, 22] as well as lottery tickets [23, 24], which resulted in a WTA/WTP disparity and undertrading. Interestingly, uncertainty was not the cause for the disparity observed in the mugs experiment [18], since the bids were made on mugs marked with clearly visible price labels.

The studies mentioned here as well as dozens of others [17] reveal a continuum ranging from induced (known) value tickets, where WTA is found to equal WTP, through market goods, where the disparity exists, and on to nonmarket goods where the disparity is largest. The WTA/WTP ratio approaches unity for induced value items, being usually about 3 for market goods, while for nonmarket goods that ratio is very large, usually about 10.

2.2.1 Theoretical Foundation of the WTA/WTP Disparity

The main psychological explanations of the WTA/WTP disparity are loss aversion [18, 19, 25] which is based on Prospect Theory [26], and the degrees of similarity and uncertainty in the cases of induced value tokens and lottery tickets [23, 24]. The main economic explanations are the substitution effect [20, 27], the tradeoff between the price of information and the expected payoff [28] and intrinsic value [29].

The Prospect Theory approach received experimental economic substantiation [30]. Similarity observed in psychological experiments [31] is equivalent to economists’ explanations of the substitution effect. Psychologists also acknowledged that lack of commensurability is necessary for the EE to manifest itself [18], again a hint for the substitution effect. The immunity of induced value tickets to the Endowment Effect also supports the substitution effect explanation as such tickets have perfect substitutes when their values are known. The degree of uncertainty or the amount of information provided have also been researched both by psychologists and by economists. The results in all cases show similar trends. Psychological theory proposed in order to explain the WTA/WTP disparity is based on observations of human behavior. This is in line with economic models, which in this area of research are inductive and based on experimental markets rather than on traditional economic assumptions. Overall it can be said that economic and psychological research are moving in the same direction, thus lending support to each other. The main underlying causes of the EE seem to be loss aversion and the substitution effect with their respective outgrowths. Variables that influence the EE are the type of good traded (induced-value, market, nonmarket) and the existence and availability of substitutes, which imply the availability of information on the market.

2.3 Implications for the Subjective Value of Information

A choice to pursue information for decision making is a result of the desire to reduce the uncertainty that characterizes certain decisions. Information in this sense is not a regular consumer good; it is more like a raw material consumed in the production of other goods down the value chain. The decisions as to what kind of information will aid in reducing the uncertainty, where to look for information, and what is the information worth are in themselves made under uncertainty. One rarely knows in advance what kind of information one will find, what will be the quality of that information, and to what extent will it actually reduce uncertainty. All this stems from the fact that information is an experience good, the value of which is revealed only after consumption and from a lack of access to meta-information. Research that would shed light on the value of information prior to consumption or what influences value formation will be of importance to information consumers, content providers, decision makers, and information system designers.

The result of the WTA/WTP disparity, or of the EE, is that it creates undertrading. Fewer trades take place than should have occurred under standard economic assumptions. As cited earlier, lack of information contributes to an increase in the WTA/WTP divergence and hence leads to undertrading. Conversely, abundance of information suggests an accelerated pace of trade. Information is an economic catalyst. Increasing its

perceived value and the demand for it should be the objective of any market-oriented organization in wishing to increase the number of trades. Since information is often a crucial component of market goods, enhancing the value of that information would enhance the overall value of the goods and diminish undertrading.

Substitution effect theory should predict a large WTA/WTP disparity for information. This is due to its inherent nature as an experience good, each item of content being unique. On the other hand, the abundance of free information on the Internet and searchers' inclination to seek free content suggest a low subjective value for information producing parity between WTA and WTP. In light of this contradiction we have chosen to begin our investigation with a fundamental question about the WTA and the WTP for information in order to form a basis for further research on factors influencing these values and other issues of importance.

Our research questions are: Where is information found on the WTA/WTP disparity continuum? Where is expertise found on this continuum? What is the effect of originality? In other words, are people sensitive to originals versus copy in their valuation of information. Our hypotheses are: H1: The WTA/WTP ratio for information (content or expertise) is greater than unity and is similar to that of private goods. H2: The WTA/WTP ratio for content is larger than the WTA/WTP ratio for expertise. H3: The WTA/WTP ratio for original information (content or expertise) is larger than for copy information. H4: There will be an interaction between the source of information (content or expertise) and its originality (original or copy).

3. Methodology

3.1 Research Instrument

A Java-based animated computer simulation of an easy-to-understand business game called "The Lemonade Stand" was used as the experimental instrument. In this simulation the player owns a lemonade stand and must operate it so as to maximize his/her profits by selling to passers-by. Information about expected weather and assumptions about its effect on demand may affect choices regarding inventory and prices. Participants are offered the chance to trade (buy or sell) this information, in addition to making decisions about inventory and prices. A detailed description of the simulation game can be found in previous manuscripts [32-34].

3.2 Procedure

The experiment was launched by a detailed in-class presentation of the simulation along with handouts that consisted of the instructions and sample screenshots. A prize was offered to the player who would achieve highest profits. Participants were told that profits could be made in two ways: 1. By trying to optimize the inventory, lemonade quality, and price per cup depending on the

weather data (if available). 2. By trading information (selling generates direct income, while buying information can generate indirect payoffs if played wisely).

A full description of the experimental session can be found elsewhere [32, 34, 35]. Market prices of the information trades were built into the simulation but were not known or revealed to the players. They were only told that market prices were to be determined randomly and that trades would be executed at market prices if the bids they offered were acceptable. This was done to ensure incentive compatibility according to the Becker-DeGroot-Marschak principle [36], known in the literature as the BDM method. In BDM, trade takes place only if bids are compatible with current market prices. BDM is therefore a useful method in eliciting private values and is a popular tool in studies of the Endowment Effect.

Participants: Two hundred and ninety four students in two groups of, respectively, one hundred and fifty and one hundred and forty four participated in the experiment as part of a class requirement. One group was presented with information as content, the other group was presented with information introduced as expertise. Participants were told, variably, about the origin of the information as being either a document or a human expert. Within each group the order of presentation of bids changed according to a Latin Square so that some participants received the buying scenario first while others received the selling scenario first. Each participant had four opportunities to bid: Buy original, sell original, buy copy, sell copy. The experimental design was, therefore 2X2X2: Buy vs. Sell; Original vs. Copy and Content vs. Expertise.

The players were seated in a computer lab with an individual computer for each player. They were not allowed to interact with each other but were allowed to ask the experimenter for clarifications. The experiment yielded one value for each type of bid for the weather information for each participant. The entire experiment lasted an hour and a half, which included the presentation, the warm-up games, and the four games with bidding.

A brief introduction to the game, a Powerpoint presentation, and a link to the game itself are available at: <http://gsb.haifa.ac.il/~draban/lemonade/>

4. Results

This section details the results received in the EE experiments. These results reflect data collected from two hundred and ninety four (294) students who provided their private value bids for buying and selling information as described in section 3.2. The data from the four groups of each of the two levels of the independent variable 'source' (content and expertise) have been combined for the analysis that follows. This analysis has been performed in order to test hypotheses H1-H4 listed in Section 2.3.

Explanation of acronyms used in the tables that follow:
WTP – Willingness to pay for original weather

information

WTA – Willingness to accept payment for original weather information

WTPC – Willingness to pay for a copy of weather information

WTAC – Willingness to pay for a copy of weather information

WTA/WTP – EE ratio for original information

WTAC/WTPC – EE ratio for copy information

H1: The WTA/WTP ratio for information (content or expertise) is greater than unity and is similar to that of private goods.

To test this hypothesis one sample t-tests were performed to compare the mean ratios of content and expertise with the values of one and three. Table 1 summarizes the findings of these tests for original and copy content and expertise.

Table 1: Results for one-sample t-tests comparing the means of the ratios for original and copy content and expertise to values of 1 and of 3.

	Mean Ratio	Std. Dev.	Test Value=1		Test Value=3	
			t	Sig.	t	Sig.
Orig. Cont.	2.79	3.45	6.37	0.00	-0.73	0.46
Orig. Expt.	2.74	3.01	6.95	0.00	-1.03	0.31
Copy Cont.	2.04	2.76	4.60	0.00	-4.27	0.00
Copy Expt.	1.85	2.27	4.53	0.00	-6.07	0.00

Table 1 clearly shows that the mean ratios for original content and expertise are significantly different than unity. The mean ratios for original content and expertise are not significantly different from three while the same ratios for copy of content or expertise are significantly different (lower) than 3. Additional analysis revealed that the ratios for copy content and expertise are not significantly different from a value of two.

H2: The WTA/WTP ratio for content is larger than the WTA/WTP ratio for expertise.

To test this hypothesis independent samples t-tests were performed to compare the mean ratios of content and expertise. Table 2 summarizes the findings of these tests for original and copy content and expertise.

Table 2: Results for independent samples t-tests comparing the means of the ratios for original and copy content and expertise.

	Mean Ratio	Std. Dev.	t	Significance
Original Content	2.79	3.45	-1.33	0.89
Original Expertise	2.74	3.01		
Copy Content	2.04	2.76	-0.62	0.54
Copy Expertise	1.85	2.27		

Table 2 shows that the mean ratios for original and copy content and expertise do not significantly differ, meaning that participants did not assign different values to different sources of information.

H3: The WTA/WTP ratio for original information (content or expertise) is larger than for copy information.

To test this hypothesis a paired samples t-test was performed to compare the mean ratios of original content and expertise and copy content and expertise. Table 3 summarizes the findings of the test of the independent variable ‘originality’

Table 3: Results for a paired samples t-test comparing the means of the ratios for original and copy content and expertise.

	Mean Ratio	Std. Dev.	t	Sig.
Original Content and Expertise	2.77	3.24	3.64	0.00
Copy Content and Expertise	1.95	2.53		

Table 3 reveals that original information is valued significantly higher than copy information.

H4: There will be an interaction between the source of information (content or expertise) and its originality (original or copy).

To test this hypothesis a univariate ANOVA was performed to compare the variances of original content and expertise ratios and copy content and expertise ratios and to test for interaction effects between the independent variables, source and originality. Table 4 summarizes the findings of the test of the independent variable ‘originality’

Table 4: Results for a univariate ANOVA comparing the variances of the ratios for original and copy content and expertise and the interactions between them.

Independent Variable	F	Sig.
Originality	11.74	.00
Source	.24	.63
Originality*Source	.08	.78

Table 4 shows that while different levels of originality bear a significant influence on private values, there is no significant difference attributed to the source of information. This is in agreement with findings shown in Table 2. In addition, Table 4 shows there is no interaction effect between the two independent variables, originality and source. Originality is significant regardless of the source. The value attributed to a specific source does not change with different levels of originality.

3. Discussion

Based on performance in a simulated business management task we have found, as hypothesized, that the subjective value of information does indeed follow the predictions of Endowment Effect theory. Participants revealed a ratio of Willingness to Accept to Willingness to Purchase (WTA/WTP) that resembles the ratio common in the case of private goods. It should be emphasized that this ratio should (analytically) approach unity. However, the empirically revealed preference here places this ratio elsewhere. Of the 294 subjects, we also found support for the hypothesis that the WTA/WTP diverges from unity more often and in a more pronounced manner for information traded in the “original” form rather than as a copy of the original, although even for copies the WTA/WTP ratio is still double. In other words, the realization that information is owned exclusively attenuates the Endowment Effect.

Another way to examine the same result is to state that exclusive access to information, that is enforceable by information systems (such as information security, encoding, etc.) might strengthen the endowment effect on subjective valuation of information.

The high variance of the ratios for copy information occurred in part as a result of a large number of people submitting bids which resulted in ratios smaller than one. This is an interesting observation because it means that participants realized that they could make a quick profit from selling information which they could later still use for themselves. This indicates a very good understanding of the game rules. Further statistical analysis of the initial data confirmed our findings. When comparing the ratio components, WTA for expertise with WTA for content, as well as WTP for expertise and for content no significant differences are observed although values for expertise were always higher than for content. WTAC for expertise

and content have been found to have a statistically significant difference ($t=2.68$; $p<.01$) and so have WTPC for expertise and content ($t=2.38$; $p<.02$). This confirms the previous finding relating to the higher value assigned to original than to copy information.

The trend toward higher value for expertise without statistical significance raises some thoughts. It shows the flattening effect of the computer where the typical e-business decision maker has to imagine an expert or a document based on text displayed on a screen. In addition, the large bidding scale in this experimental setup induced variance. Participants could place bids between 0 and 100 dollars for either buying or selling. The scale is even larger considering that decimals were allowed. Research in social science usually involves using a smaller scale such as seven-point Likert scales. The scale was not defined by any anchors which provide meaning to specific choices. Again, scales used in social sciences often have anchors such as “agree” and “disagree”. In our scale there was no ‘right’ or ‘correct’ answer. Our scale in effect is a one item measure, in contrast to psychological measures where several items are used to quantify specific traits or constructs.

The high variance is in accord with the high uncertainty associated with buying and selling experience goods. The value of experience goods is not known a priori and there is no indication for it. Perhaps smaller variance will be achieved if a ‘preview’ is made available for the weather forecast in our game. Examples of ‘previews’ for other information experience goods include abstracts of articles and film previews.

If we look at the same issue from a different angle, in electronic commerce bidding is always a one item measure. This characteristic can be manipulated. For example, a wide scale without anchors may induce higher bids which are in the interest of auction sites.

The value assigned to specific information by a certain person can vary according to external circumstances. This implies that subjective value is inherently unstable. Social science usually aims to identify stable or generalizable phenomena. Here instability is inherent. External circumstances include parameters such as timeliness, form, and content[9]. These parameters change per person and between people and are perceived differently especially when there is uncertainty about information.

While the first and third hypotheses were held up by our data, we found no support for the hypothesis regarding differences in valuation due to the source of information. Attributing the information to expertise or to a document had no significant impact on the WTA/WTP ratio. In other words, the subjective value of information is not variously affected in these results by the nature of the information. This result is surprising as we intuitively assumed a difference and because previous research has identified a difference [37]. The difference originally reported in the literature was attributed to ownership. Expertise was perceived to be privately owned rather than owned by the

organization. Information as product, a computer program, was perceived to be more organizationally owned. Sharing an organizationally owned information product was found to be mediated by prosocial transformation, people weighed the social good more than their personal benefits. In other words, according to this research when it comes to tacit knowledge, personal ownership supported sharing more than organizational ownership. This finding runs contrary to the general consensus in the knowledge management literature, which stresses the main difficulty as sharing tacit knowledge [6]. Thus, the findings of the present study align better with the knowledge management literature than with our specific hypothesis H2. In a later study [38] a product, a computer program, was perceived to be organizationally-owned and led to less sharing than privately-owned expertise. Both studies cited here were concerned with sharing information while the present focus is on trading information. It seems that people may behave differently when sharing information than when they are faced with the choices of buying and selling information.

To summarize, when trading information, as opposed to sharing it, people are sensitive to originality but not to the source. When access to some information is limited to a privileged few sets of eyeballs, that information is accorded or assigned a high value. When the information, content or expertise, becomes commonplace, its value decreases. Is it possible that the well-known economic concept of 'scarcity' governs our trading behavior as it does for other market goods? Is scarce information valued higher than widely-available information? This would mean that either behaviorally or cognitively people have not yet absorbed the concept of 'network economy', that information is distributed mostly by copying and its value does not necessarily decrease because of that. On the contrary, in a network economy value sometimes increases with wider distribution. The value of software is one such example – end-user software is often more valuable as more people use it and become dependent on it for communicating with other users.

Although our findings do not support the distinction between content and expertise and the ownership status implied by these forms of information cited in previous studies, we did find an ownership effect that resonates with the studies on information sharing and studies on EE in other market goods. First, an EE was observed and was statistically significant. EE is attributed to ownership status in the literature [18, 39]. Secondly, the fact that originality played a significant effect in the results shows that ownership matters. If everyone has access then value does drop, but if only one person has exclusive access/ownership value increases. Of course, ownership itself and perceptions of it can be affected and manipulated via system design.

A possible explanation for the surprising lack of significance of the source variable may perhaps be explained by the experimental manipulation. Both sources were explained to the participants textually on screen.

This uniformity of presentation provided experimental control. However, it may be argued that a computer can be used to present different forms of information differently. Perhaps our 'bare bones' controlled design created a flattening effect where any kind of information looks and feels the same. Graphics, sounds, and more elaborate texts could have contributed to stronger differentiation between both forms of information. This would be difficult to operationalize while keeping experimental control. Another way to examine perceptions of types of information is to experiment with stronger contrasts. Information in our experiment was important for estimating market demand for lemonade but perhaps it was not perceived as critical information. Experimenting with more critical information may elicit a difference between sources. For example, if a life-or-death situation is described as expertise, say a doctor's advice, it would be valued more than content, say an article taken from an encyclopedia. Another topic which is not a life-death question but could carry strong implications is investment information. Is analyst advice valued more than an information flier distributed by a bank? Another example may be related to professional decisions. Would we value an article we read in a work situation more than seeking an expert's advice? It would be interesting to see if a larger gap between EE ratios is revealed with further research, running the simulation game varying the criticality of the information. Of course the most obvious path for further research is to expand work on sharing information. What are the equivalent dimensions to WTA/WTP when sharing rather than trading is at stake?

Our research shows a value of about three for the WTA/WTP ratio for original information regardless of whether the source is content or expertise. The similarity between content and expertise may be attributed to some extent to the trading scenario and to some extent to the flattening effect of our simulation. However, some of our results indicate that source may become significant depending on the degree of criticality, or, in other words, source can be manipulated by system design to become more salient. Copy information received a subjective value which was significantly different (lower) than original information. This observation invites further research into information system users' perceptions of the information economy. Information systems can be used to enhance understanding of network economy and they can be used to manipulate prevailing perceptions. Finally, since the 'source' variable did not display statistical significance, it came as no surprise that no interaction with the 'originality' variable was observed. In summary, studying the subjective value of information by using a computerized simulation of a simple business game as an experimental setting where EE methodology was applied proved to be a very productive research line which should be further elaborated by future work. The nature of information which is transferred by sharing, not just by trading, also invites research which would use a similar platform to assess the interplay or interdependence between trading and sharing content and expertise.

References

1. Ahituv, N. and S. Neumann, *Principles of Information Systems for Management*. 2nd ed. 1986, Dubuque: Wm. C. Brown Publishers. 606.
2. Laudon, K.C. and J. Laudon, *Management Information Systems*. 6th ed. 2000, Upper Saddle River, NJ: Prentice-Hall, Inc.
3. Bates, B.J., *Information as an economic good: A reevaluation of theoretical approaches*, in *Mediation, Information, and Communication*, B.D. Ruben and L.A. Lievrouw, Editors. 1989, Transaction Publishers: New Brunswick, NJ. p. 379-394.
4. Shapiro, C. and H.R. Varian, *Information Rules: A Strategic Guide to the Network Economy*. 1999, Boston: Harvard Business School Press. 352.
5. Varian, H.R., *Markets for information goods*. 1998.
6. Davenport, T.H. and L. Prusak, *Working knowledge: how organizations manage what they know*. 1998, Boston, Massachusetts: Harvard Business School Press. 199.
7. Smith, L.C., *Knowledge discovery, capture and creation*. 2000, American Society for Information Science.
8. Van Alstyne, M.W., *A proposal for valuing information and instrumental goods*, in *International Conference on Information Systems*. 1999: Charlotte, NC.
9. Ahituv, N. *Assessing the value of information: Problems and approaches*. in *Tenth International Conference on Information Systems*. 1989. Boston, MA.
10. Tversky, A. and D. Kahneman, *Judgment under uncertainty: Heuristics and biases*, in *Judgment under uncertainty: Heuristics and biases*, D. Kahneman, P. Slovic, and A. Tversky, Editors. 1982, Cambridge University Press: Cambridge. p. 3-20.
11. Kahneman, D. and D. Lovallo, *Timid choices and bold forecasts - a cognitive perspective on risk-taking*. *Management Science*, 1993. **39**(1): p. 17-31.
12. Branthwaite, A., *Subjective value of information*. *British Journal of Psychology*, 1975. **66**(3): p. 275-282.
13. Bastardi, A. and E. Shafir, *On the pursuit and misuse of useless information*. *Journal of Personality and Social Psychology*, 1998. **75**(1): p. 19-32.
14. Feldman, M.S. and J.G. March, *Information in organizations as signal and symbol*. *Administrative Science Quarterly*, 1981. **26**(2): p. 171-186.
15. Thaler, R.H., *Toward a positive theory of consumer choice*. *Journal of Economic Behavior and Organization*, 1980. **1**(1): p. 39-60.
16. Thaler, R.H., D. Kahneman, and J.L. Knetsch, *The Endowment Effect, Loss Aversion and Status Quo Bias*, in *The Winner's Curse: Paradoxes and Anomalies of Economic Life*, R.H. Thaler, Editor. 1992, The Free Press: New York.
17. Horowitz, J.K. and K.E. McConnell, *A review of WTA/WTP studies*. unpublished manuscript, 2000.
18. Kahneman, D., J.L. Knetsch, and R.H. Thaler, *Experimental tests of the endowment effect and the Coase theorem*. *Journal of Political Economy*, 1990. **98**(6): p. 1325-1348.
19. Bateman, I., A. Munro, et al., *A test of the theory of reference-dependent preferences*. *The Quarterly Journal of Economics*, 1997. **112**(2): p. 480-505.
20. Shogren, J.F., S.Y. Shin, et al., *Resolving differences in willingness to pay and willingness to accept*. *The American Economic Review*, 1994. **84**(1): p. 255-270.
21. van Dijk, E. and D. van Knippenberg, *Buying and selling exchange goods: Loss aversion and the endowment effect*. *Journal of Economic Psychology*, 1996. **17**(4): p. 517-524.
22. Irwin, J.R., G.H. McClelland, et al., *Payoff dominance vs. cognitive transparency in decision making*. *Economic Inquiry*, 1998. **36**(2): p. 272-285.
23. Bar-Hillel, M. and E. Neter, *Why are people reluctant to exchange lottery tickets?* *Journal of Personality and Social Psychology*, 1996. **70**(1): p. 17-27.
24. Knetsch, J.L. and J.A. Sinden, *Willingness to pay and compensation demanded: Experimental evidence of an unexpected disparity in measures of value*. *The Quarterly Journal of Economics*, 1984. **99**(3): p. 507-521.
25. Thaler, R.H., *The psychology of choice and the assumptions of economics*, in *Quasi Rational Economics*. 1991, Russel Sage Foundation: New York. p. Ch. 7: 137-166.
26. Kahneman, D. and A. Tversky, *Prospect theory: An analysis of decision under risk*. *Econometrica*, 1979. **47**(2): p. 263-291.
27. Hanemann, M.W., *Willingness to pay and willingness to accept: How much can they differ?* *American Economic Review*, 1991. **81**(3): p. 635-647.
28. Kolstad, C.D. and R.M. Guzman, *Information and the divergence between willingness to accept and willingness to pay*. *Journal of Environmental Economics*, 1999. **38**(1): p. 66-80.
29. Boyce, R.R., T.C. Brown, et al., *An*

- experimental examination of intrinsic values as a source of the WTA-WTP disparity*. The American Economic Review, 1992. **82**(5): p. 1366-1373.
30. Horowitz, J.K., K.E. McConnell, and J. Quiggin, *A test of competing explanations of compensation demanded*. Economic Inquiry, 1999. **37**(4): p. 637-646.
31. Chapman, G.B., *Similarity and the reluctance to trade*. Journal of Behavioral Decision Making, 1998. **11**(1): p. 47-58.
32. Raban, D.R. and S. Rafaeli. *Subjective Value of Information: The Endowment Effect*. in *IADIS International Conference: e-Society 2003*. 2003. Lisbon, Portugal.
33. Rafaeli, S. and D.R. Raban, *Experimental investigation of the subjective value of information in trading*. Journal of AIS, 2003. **4**(5): p. 119-139.
34. Rafaeli, S., D.R. Raban, et al., *Online Simulations in Management Education about Information and Its Uses*, in *Educating Managers with Tomorrow's Technologies*, C. Wankel and R. DeFillippi, Editors. 2003, Information Age Publishing Inc.: Greenwich, CT.
35. Rafaeli, S. and D.R. Raban, *Experimental investigation of the subjective value of information in trading*. Journal of AIS, forthcoming 2003.
36. Becker, G.M., M.H. DeGroot, and J. Marschak, *Measuring utility by a single-response sequential method*. Behavioral Science, 1964. **9**(3): p. 226-232.
37. Constant, D., S. Kiesler, and L. Sproull, *What's mine is ours, or is it? A study of attitudes about information sharing*. Information Systems Research, 1994. **5**(4): p. 400-421.
38. Jarvenpaa, S.L. and D.S. Staples, *The use of collaborative electronic media for information sharing: an exploratory study of determinants*. Journal of Strategic Information Systems, 2000. **9**(2-3): p. 129-154.
39. Beggan, J.K., *On the social nature of nonsocial perception: The mere ownership effect*. Journal of Personality and Social Psychology, 1992. **62**(2): p. 229-237.