

The Effect of Source Nature and Status on the Subjective Value of Information

Daphne R. Raban and Sheizaf Rafaeli

Center for Study of the Information Society, Graduate School of Business, University of Haifa, Mount Carmel, Haifa 31905, Israel. E-mail: draban@univ.haifa.ac.il; sheizaf@rafaeli.net

This is an empirical, experimental investigation of the value of information, as perceived through the willingness to purchase information (WTP) and the willingness to sell it (accept payment, WTA). We examined the effects of source nature: expertise versus content, and source status: copy versus exclusive original of information on the WTA–WTP ratio. In an animated computer simulation of a business game, players could maximize their profits by making choices regarding inventory and prices. Participants were offered the chance to bid for buying or selling 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. The ratio of willingness to accept to willingness to purchase (WTA–WTP) recorded for the 294 subjects resembles the ratio common for private goods, rather than the intuitively expected unity. The WTA–WTP ratios diverged 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. The results yield a value of about three for the WTA–WTP ratio for original information whether the source is content or expertise. Copy information received a subjective value that was significantly different (lower) than original information. The implications for both online trading and online sharing of information are discussed.

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One of the central subjects of trading in business in general and in e-business in particular is information itself. Are there information system (IS) factors which might affect the purchase, sale, and pricing of information? Business thrives on both the availability and the exchange of information in various forms. Commercial transactions usually involve not just the item being traded (books, CDs, antiques, etc.) but accompanying information as well. Information is a market good; it can be valued and owned (Mowshowitz, 1992). However, it is a unique good because use and access rights

are often transferred by copying without the transfer of exclusive ownership rights. Similarly, expertise is transferred by copying because 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. Information exchange has become an integral part of business and e-business; therefore, the value of information must be part of the total transaction value estimate. Lack of sufficient information creates uncertainty which, in turn, leads to undertrading of the goods traded. Hence, appropriate pricing for information is required for healthy economic activity.

The IS literature on the value of information is vast. Usually the focus has been on the organizational level and referring to the information technology (IT) paradox. Recent articles pointing to this fact have suggested that research on value at the individual level will help illuminate the larger picture of information value at the organizational level (Chan, 2000; Lee & Menon, 2000). People's use and perception of IS eventually determines overall system value; therefore, the present research is concerned with measuring the value of information at the individual level.

So far, *information* has been discussed in the general sense of the word. Some definitions are in order before proceeding. Three closely related concepts are defined: Data, information, and knowledge. Different definitions can be found in the literature for these terms from an information systems perspective (Ahituv & Neumann, 1986; Laudon & Laudon, 2000) or from an economic perspective (Bates, 1989; Shapiro & Varian, 1999; Varian, 1998). The definitions used here were adopted from the knowledge management literature (Davenport & Prusak, 1998). While more complex and detailed definitions are available (e.g., Losee, 1997; Smith, 2000), the following definitions have been selected because they are fairly simple and parsimonious and enable operationalization. Data are discrete, objective facts about events. Information or contextualized data is analyzed. Information carries a message and makes a difference as perceived by the receiver. Knowledge or expertise is a human quality that

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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, in that its value is revealed only after use (Shapiro & Varian, 1999). The focus of this article is to offer a way to assess the value of information as content and expertise. Earlier reported findings on this issue established theory and methodology and have found it to be instrumental in assessing the general subjective value of information (Rafaeli & Raban, 2003). The present research takes a further step to propose an investigation of the subjective value of the nature and status of the source of information. How do expertise versus information products, and exclusivity impact value? We approach this 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.

The Value of Information

Several unique characteristics render information difficult to value. Information is an unusual good in many ways, including 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 is accompanied by user manuals. Purchasing decisions may also be based on the availability of expert advice and recommendation.

Information is expensive to produce and cheap to reproduce (Bates, 1989; Shapiro & Varian, 1999). 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 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. As for other private goods, value can be derived from use or from exchange (Saracevic & Kantor, 1997). 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 (Shapiro & Varian, 1999; Van Alstyne, 1999).

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 (Ahituv, 1989; Ahituv & Neumann, 1986): normative, realistic, and subjective. The normative value of information is calculated by focusing on expected utility. Normative, analytic models require a series of assumptions

about the nature of information and the characteristics of both its users and the markets within which it is traded. However, while user utility should be the base for calculating the price of information, utility varies by person and circumstance. The assumptions are often violated in practice (Ahituv, 1989). So the normative evaluation needs triangulation. Realistic methods are ex post and consequently inappropriate for evaluating information content. The problem of realistic ex-post evaluation is often termed the *inspection paradox* (Van Alstyne, 1999). 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. Prospect theory's heuristics experiments (Tversky & Kahneman, 1982) as well as later studies (Kahneman & Lovallo, 1993) 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 (Branthwaite, 1975). Bastardi and Shafir (1998) 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 (Feldman & March, 1981), implying overdemand 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 (Van Alstyne, 1999). The theoretical tension is, therefore, between studies indicating that information is undervalued and research showing information to be overvalued.

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. In other words, WTA represents the willingness to sell, while WTP stands for the willingness to buy. The disparity between WTA and WTP was named the *endowment effect* (EE; Thaler, 1980; Thaler, Kahneman, & Knetsch, 1992). 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, because they represent an individual's personal perception of an object's worth for him or herself. The EE paradigm was designed to examine subjective value by eliciting submissions of private values. This paradigm is described below. We apply the WTA–WTP methodology as used for various types of goods to investigate the subjective value of information with a view to determining what characterizes information as a good.

The Willing to Accept–Willing to Pay Disparity

The consistent, unexpectedly large, and unidirectional difference between WTA and WTP observed in relation to traditional goods and services has generated much research interest. Attempts were made to explore if the discrepancy can be explained by economic theory or if 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 articles can be found in (Horowitz & McConnell, 2002). Using the various bidding mechanisms, researchers have demonstrated that a significant disparity exists between the values of WTA and WTP for common market goods such as chocolates, pens, and mugs (Bateman, Munro, Rhodes, Starmer, & Sugden, 1997; Kahneman, Knetsch, & Thaler, 1990), and a much larger disparity with regard to nonmarket goods such as health (Shogren, Shin, Hayes, & Kliebenstein, 1994; Thaler, 1980). Research on the WTA–WTP disparity looked at trading in induced-value tickets. These are tokens of known, pure monetary value, such as a currency or promissory note. Induced-value tickets are of interest because of their abstractness and liquidity. They can be readily exchanged. Trading in induced-value tickets yielded no disparity between WTA and WTP (Irwin, McClelland, McKee, Schulze, & Norden, 1998; Kahneman et al., 1990; van Dijk & van Knippenberg, 1996). In the case of induced-value items the expected number of trades (half of all possible trades) indeed took place. 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 tickets of unknown value (Irwin et al., 1998; van Dijk & van Knippenberg, 1996) as well as lottery tickets (Bar-Hillel & Neter, 1996; Knetsch & Sinden, 1984), which resulted in a WTA–WTP disparity and under-

trading. Interestingly, uncertainty was not the cause for the disparity observed in the mugs experiment (Kahneman et al., 1990) because the bids were made on mugs marked with clearly visible price labels.

The studies mentioned here as well as dozens of others (Horowitz & McConnell, 2002) 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. Market goods have been shown to yield a WTA/WTP ratio of about 3:1. Induced-value items, for which tangibility and concreteness are reduced, while liquidity is increased, have been shown to have a WTA–WTP ratio approaching unity. For such items, the Endowment Effect does not seem to hold. On the other end, nonmarket goods produce a very large ratio, usually about 10:1.

Theoretical Foundation of the Willing to Accept–Willing to Pay Disparity

The main psychological explanations of the WTA–WTP disparity are loss aversion (Bateman et al., 1997; Kahneman et al., 1990; Thaler, 1991), which is based on prospect theory (Kahneman & Tversky, 1979) and the degrees of similarity and uncertainty in the cases of induced-value tokens and lottery tickets (Bar-Hillel & Neter, 1996; Knetsch & Sinden, 1984). The main economic explanations are the substitution effect (Hanemann, 1991; Shogren et al., 1994), the tradeoff between the price of information and the expected payoff (Kolstad & Guzman, 1999) and intrinsic value (Boyce, Brown, McClelland Peterson, & Schulze, 1992).

The prospect theory approach received experimental economic substantiation (Horowitz, McConnell, & Quiggin, 1999). Similarity observed in psychological experiments (Chapman, 1998) is equivalent to economists' explanations of the substitution effect. Psychologists also acknowledge that a lack of commensurability is necessary for the EE to manifest itself (Kahneman et al., 1990), 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 has also been researched both by psychologists and by economists. The results in all cases show similar trends. Psychological theory proposed 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, economic and psychological research is 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.

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 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 uncertainty, where to look for information, and what the information is worth are themselves made under uncertainty. One rarely knows in advance what kinds 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. Meta-information is information about information, e.g., clarifications about source, credibility, ownership, and the like. Ownership is fundamental for trade; however, it is ambiguous when it concerns information (Mowshowitz, 1992). 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. Because 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 to form a basis for further research on factors influencing these values and other issues of importance. We define two independent variables of interest, source nature and source status. Each of these is expressed dichotomously. Source nature is either expertise or an information product (document), and source status is either copy or original (exclusive). Thus, the first independent variable refers to the degree of human involvement in information source, while the second independent variable expresses exclusivity of ownership, or exclusivity of the content. The dependent variable is the willingness to pay, or accept payment (WTP and WTA) and the ratio between the two.

Where is information found on the WTA–WTP disparity continuum? Where is expertise found on this continuum? What is the effect of exclusivity? In other words, are people sensitive to the status of the source (original or copy) in their valuation of information. Our hypotheses are:

- Hypothesis 1: The WTA–WTP ratio for information (content or expertise) is greater than unity and is similar to that of private goods.
- Hypothesis 2: The WTA–WTP ratio for content is larger than the WTA–WTP ratio for expertise.
- Hypothesis 3: The WTA–WTP ratio for original information (content or expertise) is larger than for copy information.
- Hypothesis 4: There will be an interaction between the nature of the information source (content or expertise) and its status (original or copy).

Methodology

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 operates it to maximize his or her profits by managing inventory, quality, and pricing to sell lemonade to virtual passersby. Participants are expected to make rational inventory, pricing, and quality choices in an uncertain demand environment. All transactions and information flows (described below) occur online. Participants need to decide about purchasing materials such as ice, lemons, cups, and sugar. They need to set the price for the lemonade and control the quality of the lemonade that is sold, by controlling the amounts of sugar and lemons per cup. Pricing and inventory decisions are based on an attempt to forecast demand. The demand for lemonade is affected by weather permutations. 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 about the weather, in addition to making decisions about inventory and prices.

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. In this game, simulated profits could be earned in two ways: (a) By trying to optimize the inventory, lemonade quality, and price per cup depending on the weather data (if available), and (b) by trading information (selling generates direct income, while buying information can generate indirect payoffs if played wisely).

Following the introductory presentation, participants played two warm-up training games consisting of 3 business days each. One of the warm-up games allowed access to

weather information, and the second did not (Raban, 2002; Raban & Rafaeli, 2003; Rafaeli & Raban, 2003; Rafaeli, Raban, Ravid, & Noy, 2003). After the training games, each participant played four games of 3 business days each. Every game was preceded by one of four bid types: buy original content or expertise, sell original content or expertise. Each participant gave one bid on each of the four dependent variables (WTA, WTP, WTAC, WTPC). Market prices of the information trades were built into the simulation but were not known or revealed to the players. Participants were told only that market prices were to be determined randomly and that trades would be executed at market prices if the bids they offered were acceptable. The randomness in market prices was introduced to ensure incentive compatibility according to the Becker–Degroot–Marschak principle (Becker, DeGroot, & Marschak, 1964), known in the literature as the BDM method. In BDM, trade takes place only if bids are compatible with current market prices. The BDM method 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, 150 and 144 participated in the experiment as part of a class requirement. One group was presented with information introduced as inert content. The other group was presented with information that was presented as rooted in human expertise. Participants were told, variably, about the origin of the information as being either (simply) a document or as information generated by 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 $2 \times 2 \times 2$: Buy versus Sell; Original versus Copy and Content versus 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://valueofinformation.rafaeli.net>)

Results

This section details the results of the EE experiments. These data were collected from 294 students who provided their private value bids for buying and selling information. The data from the four groups of each of the two levels of the independent variable source nature (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.

	<i>M</i> Ratio	<i>SD</i>	Test value = 1		Test value = 3	
			<i>t</i>	Significance	<i>t</i>	Significance
Original content	2.79	3.45	6.37	0.00	-0.73	0.46
Original content and expertise	2.74	3.01	6.95	0.00	-1.03	0.31
Copy content	2.04	2.76	4.60	0.00	-4.27	0.00
Copy content and expertise	1.85	2.27	4.53	0.00	-6.07	0.00

have been combined for the analysis that follows. This analysis has been performed to test hypotheses 1 through 4.

Hypotheses 1: 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 shows that the mean ratios for original content and expertise are significantly different from 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 three. Additional analysis revealed that the ratios for copy content and expertise are not significantly different from a value of two.

Hypotheses 2: 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 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.

Hypotheses 3: The WTA–WTP ratio for original information (content or expertise) is larger than for copy information.

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

	<i>M</i> Ratio	<i>SD</i>	<i>t</i>	Significance
Original content	2.79	3.45	-1.33	0.89
Original content and expertise	2.74	3.01		
Copy content	2.04	2.76	-0.62	0.54
Copy content and expertise	1.85	2.27		

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

	<i>M</i> Ratio	<i>SD</i>	<i>t</i>	Significance
Original content and expertise	2.77	3.24	3.64	0.00
Copy content and expertise	1.95	2.53		

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	<i>F</i>	Significance
Exclusivity	11.74	.00
Source	.24	.63
Exclusivity · source	.08	.78

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 “exclusivity.”

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

Hypotheses 4: There will be an interaction between the source of information (content or expertise) and its exclusivity (original or copy).

To test this hypothesis a univariate analysis of variance was performed to compare the variances of original content and expertise WTA–WTP ratios and copy content and expertise WTA–WTP ratios and to test for interaction effects between the independent variables, source nature, and exclusivity (source status). Table 4 summarizes the findings of the test of the independent variable “exclusivity.”

Table 4 shows that while different levels of exclusivity 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 we found no interaction effect between the two independent variables, exclusivity and source. Source status (exclusivity) has a significant effect regardless of the source. The value attributed to a specific source does not change with different levels of exclusivity.

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 the endowment effect paradigm. 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. Or, looked at from the other side, easy-to-copy, digital information in networked contexts is a more likely subject to endowment effect perturbations than nondigital, traditionally packaged information. These findings lend further support to our previously reported findings (Rafaeli & Raban, 2003). The experiments reported here encompass many more participants. The model tested here is more ambitious, and contains additional independent variables.

The main implication of a WTA–WTP ratio that is larger than unity is that it leads to undertrading. In other words, people will purchase less information than expected. Perhaps, this is the beginning of an explanation for overinvestment in IT and the IT paradox (Lee & Menon, 2000). Employees do not value or use all IS and IT available to them. Adjusting IT investments to users’ needs and perceptions may lead to cost saving. In this article we have developed and validated a method to assess private values for information.

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. A stronger endowment effect may result in greater digital divides.

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. There are scant examples of market goods that have a WTA–WTP ratio that is smaller than unity. This, of course, is a unique feature of information that we suspect results from ambiguity in ownership. 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 suggests a flattening effect. The computer medium seems to affect the perception of sources of information. A typical decision-maker has to imagine an expert or a document based on a screen display (Daft & Lengel, 1986). In addition, the large bidding scale in this experimental set-up induced variance. Participants could

place bids between 0 and \$100 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 7-point Likert scales. The scale was not defined by any anchors to provide meaning for specific choices. 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. Viewed from a different angle, bidding in electronic commerce 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 (Ahituv, 1989). 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 (Constant, Kiesler, & Sproull, 1994). The difference originally reported in the literature was attributed to ownership. Expertise was perceived as privately owned rather than owned by the organization. Information as product, a computer program, was perceived as more organizationally owned. Sharing an organizationally owned information product was found to be mediated by prosocial transformation (group pressure), 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 consensus in the knowledge management literature, which stresses the main difficulty as sharing tacit knowledge (Davenport & Prusak, 1998). Thus, the findings of the present study align better with the knowledge management literature than with our specific hypothesis H2. In a later study (Jarvenpaa & Staples, 2000)

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 exclusivity but not to the nature of the source. When access to some information is limited to a privileged few set of eyes, 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” (Noam, 2001), 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. The endowment effect is attributed to ownership status in the literature (Beggan, 1992; Kahneman et al., 1990). Second, the fact that exclusivity 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 or ownership value increases. Of course, ownership itself and perceptions of it can be affected and manipulated via system design.

A possible explanation for our failure to find significant effects of the source nature (expertise vs. content) variable may perhaps be in the experimental manipulation. Sources were introduced to the participants in writing. 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 were described as expertise, say a doctor's advice, it would be valued more than content, say an article taken from an encyclopedia or the Internet. Another topic that 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 is? 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? Clearly, cultures vary in the respect they accord the written document. It would be interesting to see if a larger gap between EE ratios is revealed with further research, running the simulation game while 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 3:1 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. However, some of our results indicate that the source's nature may become significant depending on how critical the content is. 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.

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 that should be further elaborated by future work. The nature of information 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.

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AUTHOR QUERIES

AQ1: AU: WTA/WTP - Slash commonly denotes “either/or.” Per journal style, slash has been changed to a one en dash to show the connection between the two terms.

AQ2: AU: Correct year? 1999 in Reference List.

AQ3: AU: Please provide month meeting was held.

AQ4: AU: Please provide volume number.

AQ5: AU: Please give inclusive page numbers for the chapter within parentheses here.

AQ6: AU: Please give month day, year you accessed site.

AQ7: AU: Please give editor(s) of text.

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