MARKETING 2.0: SECURITIES TRADING OF CONCEPTS

Uncovering People's Biases Using the Wisdom of Crowds

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ABSTRACT

Identifying winning new product concepts requires insight into consumer preferences, which represent private information held by each consumer. We apply two novel "wisdom of crowds" methods to the process of uncovering preferences: (1) Securities Trading of Concepts (STOC), and (2) The Preference Game. This is the first application of such markets and games to test potential new product concepts and to compare such an approach against stated-choice, conjoint and longitudinal revealed preference data. These methods help reveal unstated preferences by revealing biases. We address the challenge of validating simulated market results in which actual outcomes cannot be observed.

To address the need for external validity we compare STOC trading and Preference Game results against preferences measured through: (1) virtual concept testing, (2) stated-choices, (3) actual sales of the subset of product concepts that are launched in a simulated store and in the real marketplace, (4) surveys of individuals' expectations of others' preferences and (5) full-profile conjoint analysis. These experiments reveal that the both aggregate estimates of other peoples preferences and market prices of securities designed to represent product concepts are remarkably efficient, accurate, and internally consistent measures of expected market share based on group preferences, even when conducted with relatively few traders. In contrast, the quality of each *individual*'s estimates and stock trading is much *less* predictive of aggregate preferences, so gathering the wisdom of the crowd is seen to be a key element of the success of these approaches.

Keywords: **preferences, market research, biases, wisdom of crowds, new products, concept selection**

Corresponding author: Ely Dahan, 2542 Cardigan Court / Los Angeles, CA 90077 USA, edahan@mac.com. This is an abridged version of "Securities Trading of Concepts" (2010) by E. Dahan, A. Kim, A. Lo, T. Poggio, and N. Chan and "Preference Markets" (2010) by E. Dahan, A. Soukhoroukova, and M. Spann, combined with new, sole-authored research on Expectations of Other People's Preferences by E. Dahan.

1. INTRODUCTION

A new method combining preference measurement and the wisdom of crowds is proposed as a way of encouraging constituencies outside the firm, including the firm's collaborators and customers, to participate in the creation and evaluation of new product concepts. Beyond the benefit of stimulating collaborative creativity, the proposed method reduces respondent costs by improving on all five dimensions affecting survey costs.

1.1. Motivation

Increasingly, people outside the firm's internal product development team participate in the process of creating new product concepts and evaluating which ones should be launched. The high number of products and attributes that result from such open innovation and collaborative creativity necessitates filtering mechanisms to narrow from a large number of potential ideas to those few worthy of further investigation and investment.

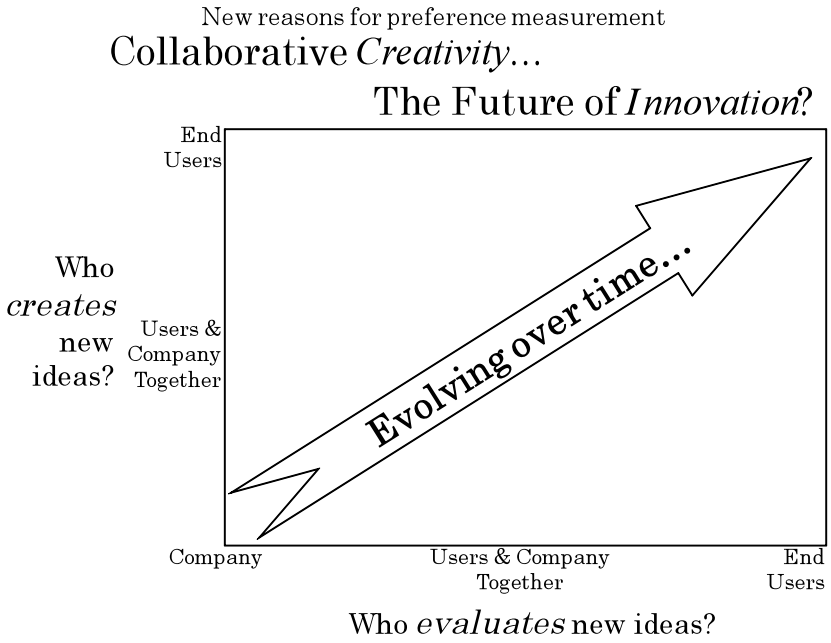

Figure 1: The need for a new Filtering Mechanism

1.2. The STOC method

Simply put, Securities Trading of Concepts (STOC) applies the pricing mechanism used in financial markets as a means of evaluating consensus preferences for the concepts being studied. "Stock" prices represent measures of the intensity of preference for particular product concepts or attributes. For example, a stock price of 25 could represent a consensus belief that 25% of consumers would prefer that particular concept. A conceptual model of the STOC method appears in Figure 2.

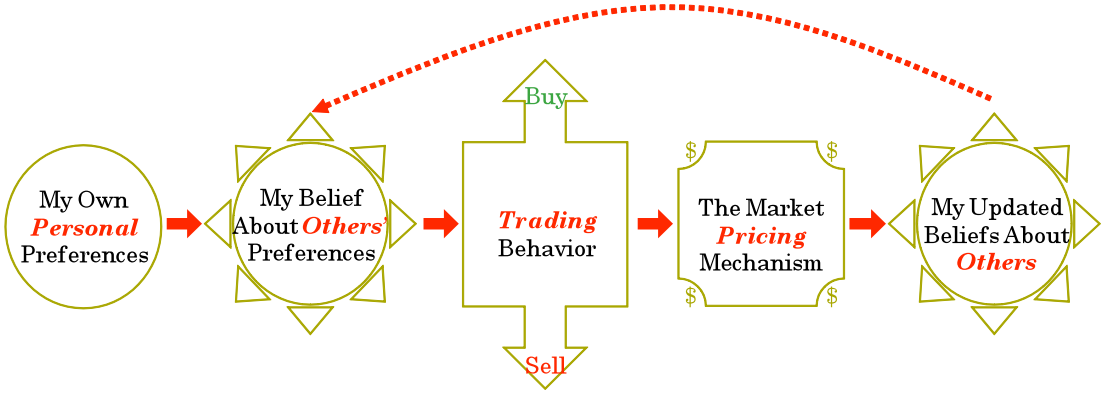

Figure 2: Conceptual Model of Preference Markets

As Figure 3 summarizes, STOC markets differ from prediction markets and information markets in several key ways including what is measured and how quickly.

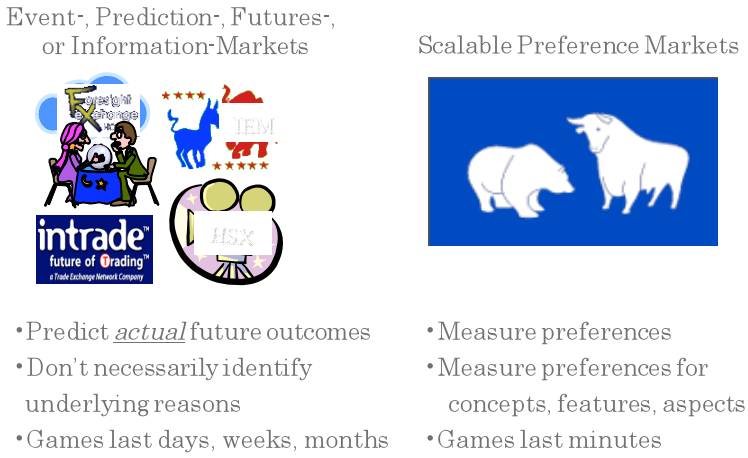

Figure 3: Comparison of Prediction Markets vs. Preference Markets

To design and execute a STOC market, the research proceeds through the five steps outlined in Table 1. It is important to carefully consider the ability of participants to form preferences for the concepts being evaluated and to provide insight about others' preferences. This requires clear depictions of the concepts being tested and simple explanations of the process of trading and winning in the STOC game.

Table 1: Five Key Steps to Designing and Executing a STOC Experiment

Step	Description	Challenges	Key Considerations
1	Choose STOC Concepts	Narrowing from many options	Stocks should clearly and concisely depict multiple product concepts that differ from each other. Not every trader has to see every stock.
2	Define STOC Prices	Open-ended vs. precise definition	Traders need to understand the definition of each stock, e.g. "the % of people who prefer this concept" or "market share of this product"
3	Define & Teach Trading Method	Programming & User Interface	The user interface should be easy-to-use, informative about the trading activity for each security and trader performance
4	Trading & Data Collection	Need Simultaneous trading; Trader Errors	Transaction details between any two traders needs to be recorded: security name, volume, price, timing. Traders should be able to review, edit and cancel open orders that have not
5	Data Analysis	Choosing a metric; What is measured?	The metric should include all information such as the number of shares traded and at which price

Important elements of steps 1-4 are depicted in Figure 4, including, clockwise from upper left, the web-based trading interface, depiction of the AirStik bike pump, an attribute level comparison of all competing concepts, and a graph of the price and trading volume for one stock at a time.

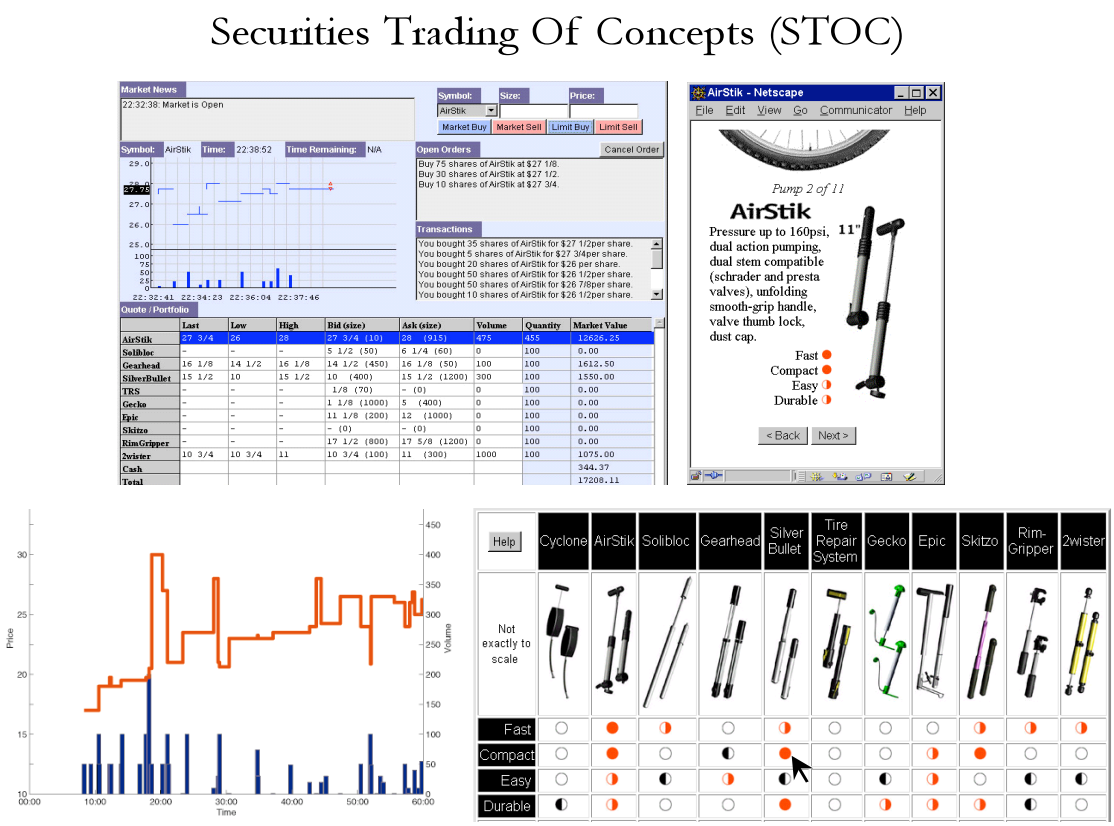

Figure 4: Key Elements of the STOC User Interface

1.3. Reducing Respondent Cost

Beyond its ability to evaluate consensus preferences for many product concepts and attributes at a time, STOC has the added advantage of reducing the respondent costs. The formula below captures the total costs of recruiting and compensating respondents for the purpose of evaluating a large number of product concepts.

$$TC = \left(M \cdot \frac{N_{sample}}{q_{respondent}} \right) \times \left(\frac{c_{recruit}}{r\%} + c_{respondent} \right)$$

where the components of costs are summarized in Table 2.

Table 2: Five Routes to Lower Respondent Costs in Concept Testing

Symbol	Description	Challenge	To Lower Cost	STOC's potential Benefit
N_{sample}	*N*umber of required Respondents	Statistical power	Reduce N_{sample}	Lower due to *interactions* with others and *multiple answers* per respondent
$q_{respondent}$	*q*uestion capacity per respondent	Bounded rationality	Increase $q_{respondent}$	Higher due to *motivation* and ability to self-select questions to be traded
$c_{recruit}$	*c*ost to recruit people	People avoid surveys	Reduce $c_{recruit}$	Lower because recruits are *attracted* to playing the game, even multiple times
$c_{respondent}$	*c*ompensation for respondents	People value their time	Reduce $c_{respondent}$	Lower due to the intrinsic pleasure of playing the *game* itself
$r\%$	*r*esponse rate	Many people opt out	Increase $r\%$	Higher due to *intrinsic* pleasure of game, desire to play again, *competitiveness*

As the table above outlines, the STOC method has the potential to reduce the total cost significantly on each of the five dimensions. We anticipate potential cost reductions of as much as 75% or more for respondents and recruiting. Of course, the overall costs of such testing must account for the development and operation of the STOC infrastructure itself, bit most of those costs are fixed rather than variable.

2. TESTING STOC MARKETS

To address the need for external validity we compare STOC trading results against preferences measured through: (1) virtual concept testing (of bicycle pumps and crossover vehicles), (2) stated-choices (of actual crossover vehicles and Wii video game concepts) and (3) actual sales of the subset of product concepts that are launched in a simulated store (laptop bags) and in the real marketplace (crossover vehicles), (4) surveys of individuals' expectations of others' preferences and (5) full-profile conjoint analysis (of bike pumps and Wii video games). These experiments, summarized in Table 3, reveal that the market prices of securities designed to represent product concepts are remarkably efficient, accurate, and internally consistent measures of expected market share based on group preferences, even when conducted with relatively few traders. We also note that while STOC prices measure preferences reasonably well, they do not necessarily predict actual sales.

Table 3: Data Collected for each of Four Product Categories

Method / *Product type*	Experiment	STOC Method	Conjoint Analysis	Virtual Concept Test	Self-Stated Choices	Simulated Store	Longitudinal Sales Data
Bike Pump Concepts	Tests 1 & 2 *n* = 28	9 Pumps; Same traders tested twice	Rank 18 full profiles, est. 10 parameters w/LINMAP *n* = 141	Dahan and Srinivasan '00 VCT Physical, VCT Web; *n* = 102, 87			
Actual Laptop Bags	Test 1 *n* = 50	*Table* of 8 Laptop Bags				Toubia, et. al. 2003 unit shares for 8 bags sold in the simulated store; *n* = 143	
	Test 2 *n* = 62	*Images* of 8 Laptop Bags					
Actual Crossover Vehicles	Test 1 *n* = 49	8 vehicles *No* Prices		VCT with and without Prices	Top 3 of 8 with prices		Cumulative units sold for each of 8 vehicles from 2001-2006 per *Ward's Automotive News*
	Test 2 *n* = 43	8 vehicles *No* Prices		VCT with and without Prices	Top 3 of 8 with prices		
	Test 3 *n* = 42	8 vehicles *With* Prices		VCT with and without Prices	Top 3 of 8 with prices		
	Test 4 *n* = 16	8 vehicles *No* Prices		VCT with and without Prices			
Wii Video Game Concepts	Test 1 *n* = 35	8 Own Wii Video Games	Rank 16 full profiles, est. 10 parameters w/ LINMAP *n* = 35 & 65	Constant Sum Allocation of 100 Points across 8 or 11 Wii Games in (4) Surveys: • SELF Preferences • E[Others' Preferences] • E[STOC prices] • E[Actual Share] after STOC game			

2.1. Scalability

A benefit of the STOC method is that it scales up to handle as many attributes and concepts as necessary, with the total number of testable ideas limited only by the number of traders. This scalability derives from the fact that *each trader* need only focus on a finite number of concepts while clever experimental design enables the *market* as a whole to evaluate an unlimited number of concepts.

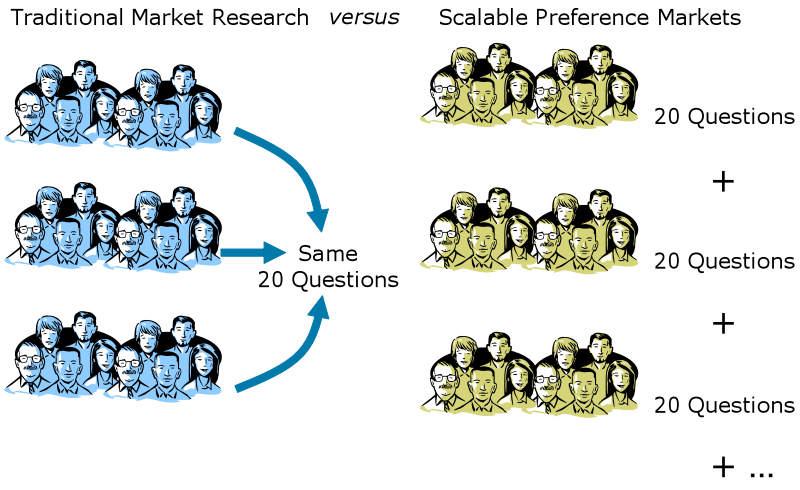

Figure 5: The Scalability of STOC markets

Figure 6 depicts a sample experimental design for a STOC market in which 56 smart phone concepts and attributes are traded by six different groups of traders, each of which trades only 20 of the 56. Note the overlaps between groups for at least *some* of the stocks. A rule-of-thumb is that for every stock being tested, at least one or two traders should be recruited.

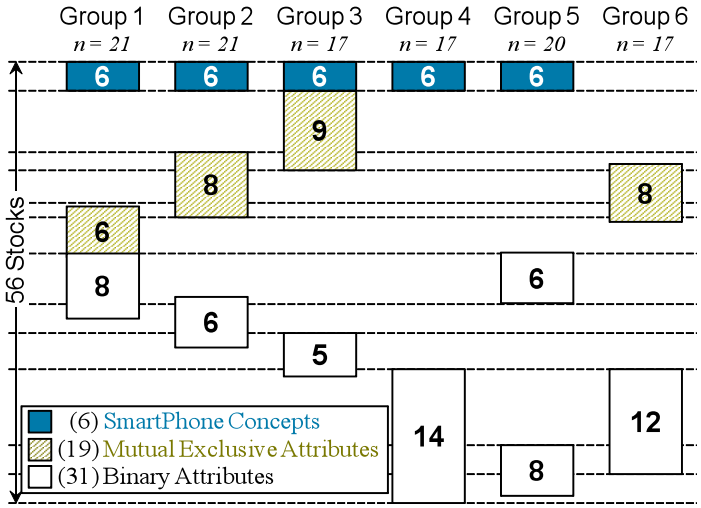

Figure 6: Sample Experimental Design shows 113 traders divided into six groups can trade 56 stocks, with each trader focusing on 20 stocks

2.2. STOC Results

Figure 7 plots the 56 stock prices from the experimental design depicted in Figure 6 against the mean results from individual surveys of respondents' expectations of others' preferences. Briefly, 56% of the variance in expectations of others is explained by the STOC prices.

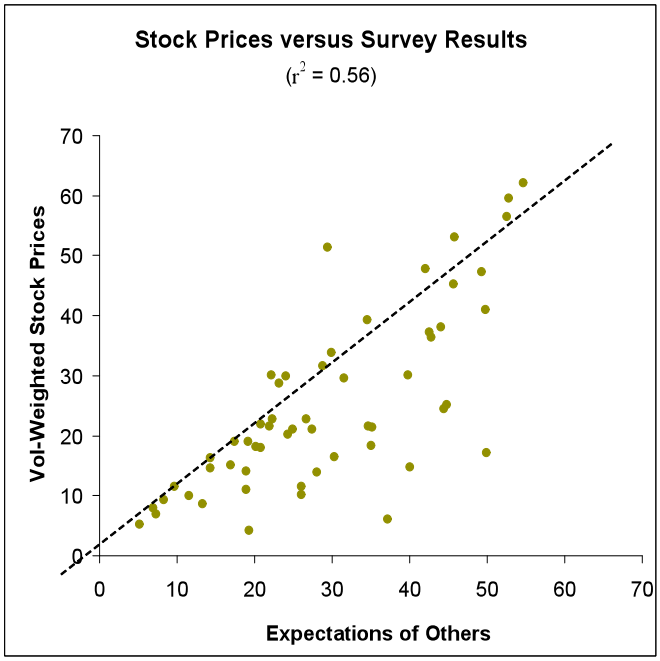

Figure 7: The 56 stock prices correlate highly to survey-based methods of measuring respondents expectations of others' preferences, as seen in this experiment

In addition to quickly generating results that correlate highly to consensus preferences, and doing so in a scalable way, Figure 8 shows that the STOC method is highly preferred by respondents over the survey method.

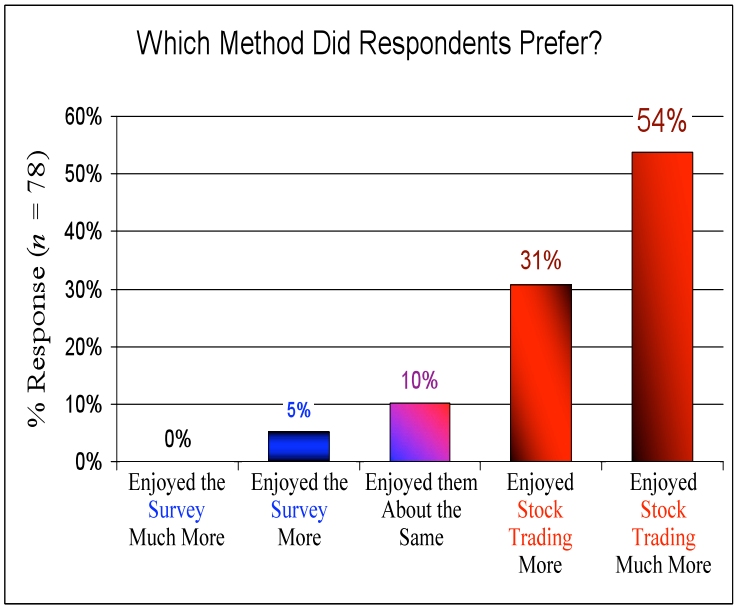

Figure 8: Most respondents prefer the STOC method over individual surveys

The fact that respondents prefer the STOC method over individual surveys as a way of expressing their preferences has the potential benefit of improving the last three factors in Table 2, thereby lowering the total cost of recruiting and compensating respondents.

3. EXPECTATIONS OF OTHERS

Two extra costs that STOC imposes in measuring preferences are *infrastructure* expenses for developing and operating the trading system ad any extra costs associated with arranging for all of the respondents to be available *simultaneously* for trading. Which begs the question, can an approach be developed with the benefits of STOC (low cost, speed, scalability, the benefits of competition), without reverting to traditional market research surveys?

The answer is yes. We propose a variation of preference markets that does not require simultaneous trading. In fact, no actual *trading* between respondents is required at all. Rather, all that needs to be measured is individual respondents' expectations of others preferences. This can be accomplished in simple, asynchronous, individual surveys without sacrificing the novelty and motivational benefits of a competition. In this case, the competition determines who is the best guesser about others. As Figure 9 shows, the E[Others] approach yields surprisingly high correlations (r^2 = 0.77) between mean individual preferences and mean expectations of others preferences for the same 56 smart phone stocks in the previous experiment.

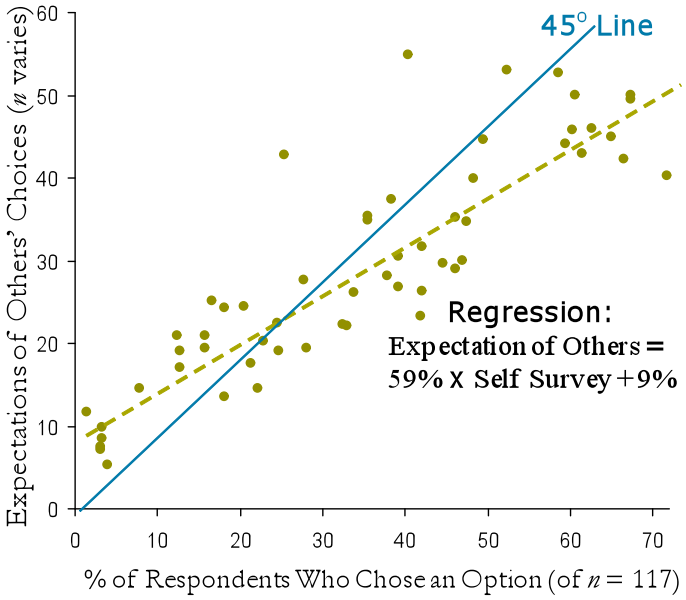

Figure 9: How do individual preferences translate into expectations of others?

As a further test of the validity of the E[Others] method, 69 executive MBA students used a constant sum method of voting for 15 information appliance concepts. They then used the same constant sum approach to express their expectations of others votes. The average participant had a 0.24 r^2 between his or her expectations of others and the actual mean preferences of others. The highest performing individual had a r^2 of 0.73. But, as depicted in Figure 10, the crowd's mean expectations of others preferences had an r^2 0.83, exceeding the performance of every individual member of the crowd.

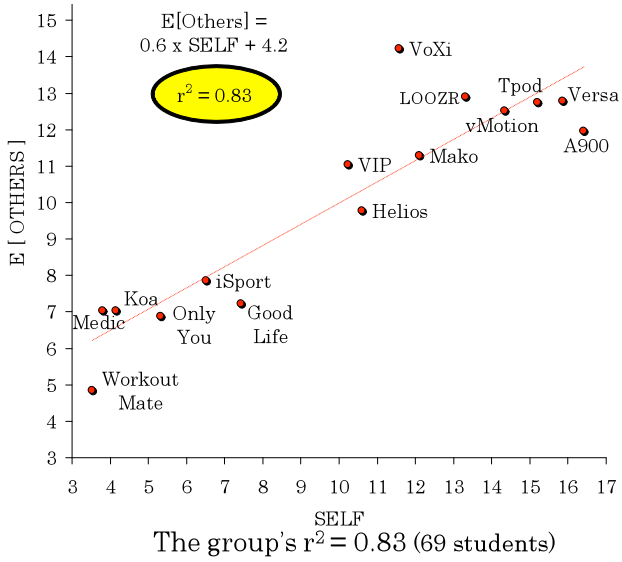

Figure 10: Fifteen Information Appliances Designed by Executive MBA's

In summary, E[Others] provides most of the benefits of STOC, but with lower requirements for infrastructure and the need for simultaneous participation. Both methods show much promise as potential filtering mechanisms for narrowing from many potential ideas to the most promising ones worthy of further investigation and investment.

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