The Relevancy of Group Expertise for the Accuracy of a Prediction Market

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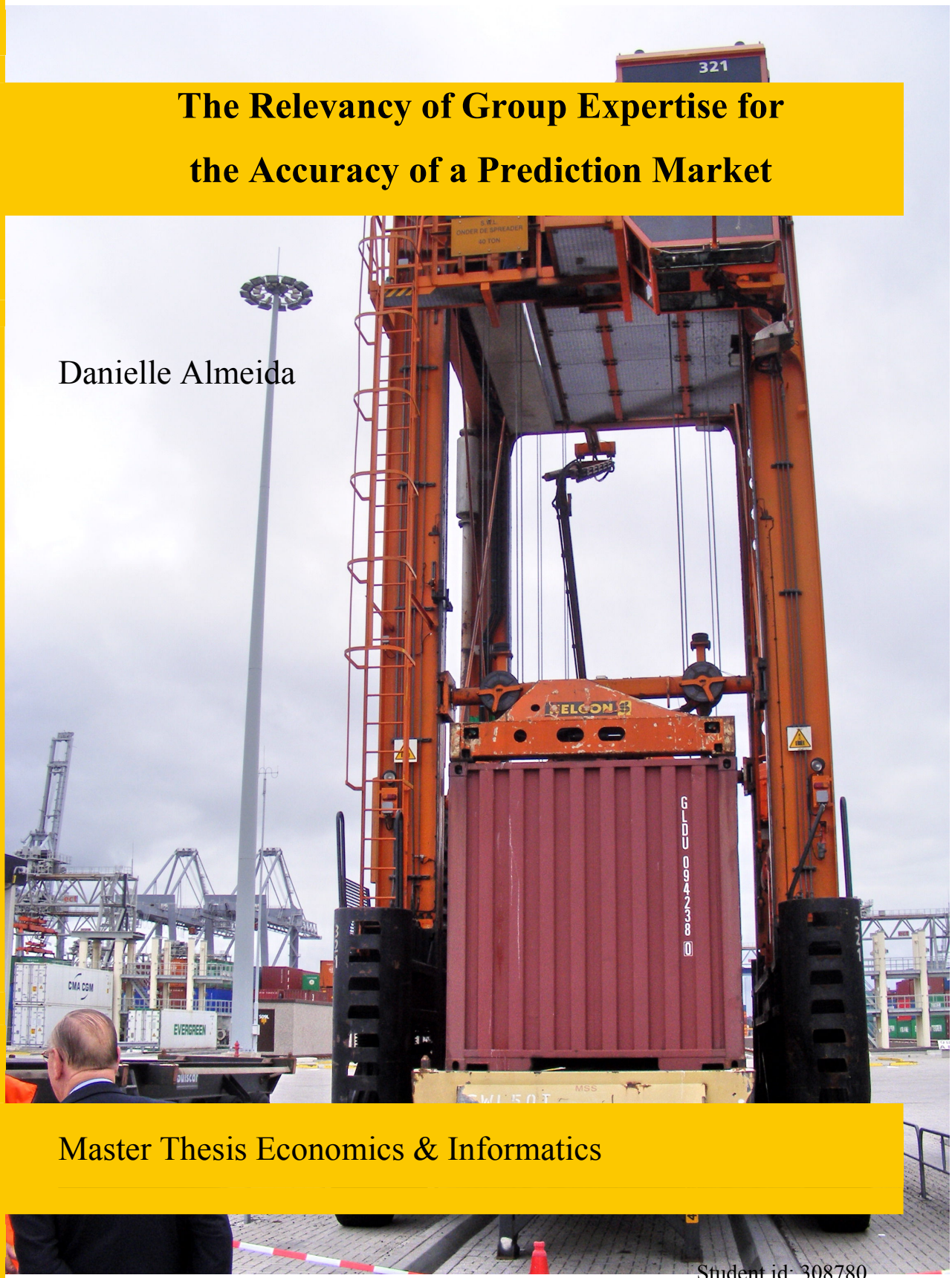

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Abstract

This research has focused on the relevance of group expertise with regard to a prediction market. A prediction market is a futures market in which a large group of people can express their opinion about the out coming of a certain event by buying shares from the answer that – according to the participant – is most likely to be correct. Prediction markets are increasingly implemented in enterprise environments.

The main goal of this research has been to advise companies that have implemented or are considering implementing a prediction market about which type of participants – with regard to expertise in the specific field – to include in the prediction market environment to get the most accurate results. An experiment has been performed during the Wimbledon competitions of 2009. Two prediction market environments have been set up to be able to compare the accuracy of the predictions of experts versus non-experts. Also, a survey among the (possible) participants of the Wimbledon experiment has been performed, mainly to get a better insight in the decision making process of the two groups. In addition, two data sets in a non-prediction market environment have been analyzed. The first one is a European Championship pool of soccer in 2008 in which the group results of experts were compared with non-experts. The second data set that has been analyzed is regarding the predictions of the AEX-index in the next month and six months. Again, the accuracy of experts was compared with the accuracy of the non-experts.

Our main conclusions have been that experts do not significantly make more accurate predictions than non-experts. This implies that all types of participants should be included in an enterprise prediction market. However, it is more difficult to trigger non-experts to participate then it is to trigger the experts. To that respect, it has been suggested to further research how to give non-experts incentives that will lead to a higher overall response rate. Another conclusion has been that there is a difference between the strategy of experts and non-experts while predicting. The effect of the strategic differences between experts and non-experts on the prediction market is another interesting topic that should be further researched.

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1. Introduction

Company's decisions are frequently based on forecasts. For this reason, companies have a need to forecast business events, such as the sales of next quarter or whether or not to launch a new product. Accurate forecasts lead to accurate decisions which can benefit the company's daily activities and profits. Therefore, it is important that these forecasts are being made accurately and to the best interest of the company.

Often, business decisions based on forecasts are made by experts in the specific field. However, according to Surowiecki [10] a crowd of people makes better predictions about future events than an expert, or even a very small group of experts.

1.1 Overview of the problem

Prediction markets are futures markets in which a large group of people can express their opinion about the out coming of a certain event by buying shares from the answer that – according to the participant – is most likely to be correct. The participants' confidence that the event will occur is reflected by the amount of shares bought from a certain answer. By betting on an answer, the price of that share increases. The price of the share is interconnected with the probability that the event occurs. When many people buy shares from one answer, the price of the share - and therefore the probability that this answer is correct – increases.

Nowadays, prediction markets are increasingly used in companies, in areas such as sales forecasting, project management and product innovation. Companies as Texopus Predictions, Qmarkets, Consensus Point and Crowdcast provide their services to companies to implement prediction markets for answering all types of business related questions. Electronic Arts, Google, Hallmark, Best Buy and Motorola are examples of companies that have already implemented a prediction market into their decision making process. Each company has implemented the prediction market in its own way, allowing different types of participants. One company only allows customers and another company allows all employees to participate in the prediction market. Some companies only allow a specific group of employees to participate in the prediction market. In general, this specific group are 'experts' in the specific field or area.

In addition to the fact that companies allow different types of participants to their predictions, previous research [4] has shown that the type of participants is of great importance when an enterprise wants to successfully implement a prediction market. To that respect, it is relevant to know whether the expertise of participants in a certain area is of significant importance to the accuracy of the out coming of the prediction market. This leads us to the central question of this thesis: does a group of experts that participate in a prediction market outperform a randomly selected group of people or 'non-experts' participating in a prediction market?

1.2 Research scope

Our research has focused on analyzing which group of people makes more accurate predictions within a prediction market: experts or non-experts. We have researched the performances of experts and non-experts in prediction markets. Also, previous research and available data on their performances in a non-prediction market environment has been researched to support our study.

This information is of importance for companies that have implemented or want to implement a prediction market in the company's decision making process. With the results of this research, companies will have more knowledge on which type of people to select as participants for their prediction market to obtain the best possible results.

1.3 Research question

We have defined the following main research question to be able to investigate our previously defined problem:

- *Is group expertise relevant for the accuracy of a prediction market?*

This main research question has been divided in the following sub research questions.

1. What have been the results of previous research regarding predictions of experts and non-experts?

   With this sub research question we wanted to get a clear view of the results of the research that has been performed so far in a 'non-prediction market environment'.

2. How can we define the characteristics of both the experts and the non-experts and what are the similarities and differences?

   We looked at the characteristics of the experts and non-experts and derive what the differences and similarities are. We have performed research in a prediction market environment as well as in a non-experimental environment.

3. Which group makes better predictions in which situation(s)?

   We have researched whether there is a significant difference between a prediction market populated by experts and a prediction market populated by non-experts. We have investigated this, looking at several variables and perform this research for the prediction market environment as well as the non-prediction market environment. The main goal of this research question has been to know whether one group makes better predictions in which situation(s).

4. What are the differences in results derived from prediction markets when comparing them to 'normal' predictions?

   We have compared the results of the performance of both experts and non-experts within the prediction markets to 'regular' forecasting abilities of experts and non-experts. We have searched for contradictions and similarities between the results of both groups.

5. What are the differences in how both groups make decisions?

   To conclude, we have researched whether there are differences in the way experts and non-experts make their decisions. This has mainly been analyzed in a prediction market environment.

1.4 Methodology

We have answered the previous formulated research questions using the following methodologies.

Experiments

We have performed an experiment in a prediction market environment. Since there is no previous research available in this specific area and we have researched whether experts are significantly better in making predictions when using a prediction market to capture their opinion.

We have classified two groups of people: experts and non-experts. Furthermore, we have set up two separate prediction markets – one for each group – to be able to compare the results of the two groups. During Wimbledon 2009, we have asked these two groups to participate in the prediction markets, answering the same questions. We have analyzed these results based on several variables.

Analyzing obtained data

We have obtained data from two different sources and have researched whether experts have made significant better predictions than non-experts. This analysis is meant to support the findings of the experiment of Wimbledon. Our analysis of obtained data can be divided in two topics: predictions of the AEX-index and predictions of the European Championship pool of 2008 (EC2008).

With regard to the AEX-index, we have obtained data from two employees of www.iex.nl about monthly predictions of experts and non-experts regarding the AEX-index during an eight years period. This data includes one-month and six months predictions of the AEX-index.

We also have had access to a European Championship pool for soccer of 2008 in which 50 people have been divided into two separate groups: experts and non-experts. Again, we have analyzed this data to be able to see the differences and similarities when comparing these results to the results of the experiment of Wimbledon. This research has been performed in a non-prediction market environment.

Survey research

We have conducted a survey with the Wimbledon participants to be able to get more insight in the behaviour of participants in prediction markets and their opinion on participating in a prediction market.

We have used quantitative data analysis to be able to draw conclusions about the several independent research cases and qualitative date analysis, namely cross case analysis, to be able to draw conclusions across the researched cases.

1.5 Structure of thesis

In chapter two, we have described the relevant background information on the related topics that have been discussed in this thesis, namely prediction markets – especially used in companies –, the different levels of knowledge that we have distinguished in this report and the results we have found through previous research of the predictive skills of experts in the sport and financial area in a non-prediction market environment. This analysis is meant to get a better insight in previous research regarding predictions performed by experts compared with non-experts in a non-prediction market environment.

In chapter three, we have described what methodology has been used for (i) the experiment of Wimbledon, (ii) the obtained data (EC2008 and AEX-index) and (iii) the survey among the participants of the Wimbledon experiment. The experiment of Wimbledon and the survey has been performed in a prediction market environment, while the analysis of the obtained data has been performed in a non-prediction market environment.

Chapter four elaborates on how the theoretical model has been applied for the Wimbledon Case. It describes how the research has been performed and will give the reader insight in what decisions have been made during the research and why.

Chapter five continues with the results that can be drawn from the Wimbledon experiment. We will elaborate on the results that have been found regarding the predictive skills of experts and non-experts within a prediction market environment. In addition, we will present the results from our survey research.
Since we have also analyzed additional data, chapter six describes the results based on the data of the European Championship pool of 2008 and the AEX-index. As previously mentioned, this data has been obtained in a non-prediction market environment and is meant to support our findings in the Wimbledon experiment.

In the final chapter, we have made a summary of the results from the Wimbledon case, the Wimbledon survey and the obtained data and have drawn our final conclusions. Furthermore, we have described the management implications and suggested future research based on the results.

2. Prediction Markets and Expertise

This chapter gives an overview of the most important topics that will be discussed in this thesis. We will first describe what prediction markets are and what the advantages and disadvantages of prediction markets used in companies are. Secondly, we will discuss the different definitions and interpretations of what an expert is. To conclude, we will report on the results of previous research on experts versus non-experts in a non- prediction market environment.

2.1 Prediction markets in general

Prediction markets are futures markets in which prices are used to predict future events [1]. Prediction markets are different from traditional market research as it does not ask participants for their opinion or experience. Instead, it is designed to aggregate information and produce predictions about future events [2]. For example: 'Will the next president be Obama?' or 'What are the total sales in the next quarter?' Financial or non-financial incentives are used to reward the participants for their participation. This is comparable to the mechanism that is used in stock markets.

Table 1 shows the best-known prediction markets [3]:

Market	**Focus**
Iowa Electronic Markets (www.biz.iowa.edu/iem). Run by the University of Iowa.	Small-scale election markets. Similar markets are run by the University of British Columbia in Canada (UBC) and the Technical University of Vienna in Austria (TUW).
TradeSports (www.tradesports.com). For profit company (currently terminated).	Trade in a rich set of political futures, financial contracts, current events, sports and entertainment.
Economic Derivatives (www.economicderivatives.com). Run by Goldman Sachs and Deutsche Bank	Large-scale financial market trading in the likely outcome of future economic data releases.
Newsfutures (www.newsfutures.com). For-profit company	Political, finance, current events and sports markets. Also technology and pharmaceutical futures for specific clients.
Foresight Exchange (www.ideosphere.com) Non-profit research group	Political, finance, current events, science and technology events suggested by clients.

Table 1: Examples of prediction markets

Prediction markets can be used for several reasons. The two main types of prediction markets are (i) public prediction markets – which are focused on predictions for any users such as betting or election predictions – and (ii) enterprise prediction markets, which are focused on predictions that are performed within a company. Examples of predictions in a company are: sales forecasting, project management and product innovation.

In the next paragraph, we will focus on the advantages and disadvantages of enterprise prediction markets. However, these may also be applicable for public prediction markets.

2.2 Advantages and disadvantages enterprise prediction markets

In this research, we have focused on the area of enterprise prediction markets. We believe this is a still a under exposed area of prediction markets, which can be very successful when implemented and interpreted correctly.

Advantages

Most companies that use prediction markets agree it is a good way to aggregate diverse information. The result of a prediction market is said to be comparable with traditional forecasting, but it is a lot cheaper [4]. This can be a good reason for a company to start using prediction markets.

A prediction market can improve communication and efficiency within a company because employees feel more involved in the decision making process and management is able to get a better insight in the opinion of the employees and possibly other relevant groups [4].

In general, participants of prediction markets go through a learning curve in which the accuracy of the predictions improves. The learning curve in prediction market means that the more predictions a participant makes, the better the prediction will be. A reason for this might be that prediction markets allow individuals to piggyback their personal learning on others' information [9]. This can benefit the company in different ways: (i) the prediction gets better, which means it can make a better planning and reduce costs and (ii) the employee gets more involved in the wellbeing of the company which can also benefit the company.

Its flexibility of use is a feature that companies are very content with; a prediction market can capture and aggregate a lot of information. Also its flexibility in terms of number and location of participants is highly appreciated within companies. It seems to give participants incentives to acquire more information to be able to make better prediction [4], which might be an explanation for the learning curve.

Disadvantages

First of all, the process of implementation – in particular educating the participants how they should use the prediction market – is very time consuming. Especially when the bet is placed within working hours, this can be an obstacle for companies to implement a prediction market [4].

Secondly, there is the issue of incentives: companies are concerned with how to motivate employees to participate in the prediction market. It is said that for some employees, prices are not enough of an incentive [4]. However, research has shown that there is no significant difference in the accuracy of the outcome of prediction market when play-money is used compared with real-money [2].

Another difficulty is that employees who are mostly interested in participating in the markets have specific characteristics. According to previous research, there is mainly a higher participation with programmers and people that are employed longer, more embedded in the company and slightly more senior employees. In addition, newly hired employees make too optimistic predictions [15]. Companies struggle with deciding who should participate in the prediction market.

It seems to be important how the results of a prediction market are interpreted. Some companies combine the outcome of the prediction market with other forecasts, while others use the prediction market as the only input for the actual decision or forecast. The type of participants also seems to be an important factor to implement a prediction market successfully. Companies using different types of participant are more satisfied with the results than companies that only let employees or a selection of employees participate [4]. The fact that companies do not exactly know which people should participate, is an uncertainty that may lead to companies being hesitant to implement a prediction market.

2.3 Expert, novice and naïve decision maker

Since the relevance of the type of participants based on their knowledge in the specific field or area has been researched, we will now discuss the main different categories of knowledge which will be referred to during this research. We have categorized knowledge and have made a distinction between an expert, a novice and a naïve decision maker. Although more levels of knowledge can be defined, we consider these three definitions as most relevant for our research.

People tend to have their own ideas about what defines an 'expert'. In the words of Franklin D. Roosevelt, 32nd President of the United States:

"There are as many opinions as there are experts".

According to the Free Dictionary an expert is ”a person with a high degree of skill in or knowledge of a certain subject” [11]. This definition is not clear on how many ‘skills’ or how much ‘knowledge’ someone has to obtain before he may call himself an expert.

Kolodner [26] has stated the following two major differences between experts and novices:

- Experts are more knowledgeable about their domain.
- Experts know how to apply and use their knowledge more effectively than does a novice.

However, in this definition there are no objective criteria available which can be used to distinct the expert from the novice.

For this reason, Shanteau [27] has made a more measurable distinction:

- **Experts**: those who have reached the pinnacle of their profession and are referred to by their colleagues as being the best at making decisions.
- **Novices**: decision makers who may have considerable knowledge and experience, but have yet to reach the level of the experts.
- **Naïve decision makers**: those who have little, if any, skill in making decisions in a given area. Although they may have some knowledge and background, they are beginners.

From this perspective, the ‘experts’ as used in most research could in fact be more like novices [27].

Kolodner [26] has maintained the following distinction between experts and novices: a novice is a person who has gone to school and has acquired book knowledge. After he has experience in using the knowledge he has learned, and when he knows how it applies both to common and exceptional cases, he is called an expert. The keyword that distinct an expert from a novice seems to be *experience*.

Again, other definitions of an expert, novice and naïve have been made by Hoffman [28]:

- **Expert**: highly regarded by peers, whose judgments are uncommonly accurate and reliable, whose performance shows consummate skill and economy of effort, and who can deal effectively with certain types of rare or “tough” cases. He also has special skills or knowledge derived from extensive experience with sub domains.
- **Novice**: someone who is new – a probationary member. There has been some minimal exposure to the domain.
- **Naïve**: one who is totally ignorant of a domain

This definition of expert has similarities with Shanteau’s definition, since both researchers have stated that experts are people who are pinpointed as experts by other colleagues or peers.

Based on these different definitions, it is safe to say that there are many different views on what defines an expert, or even what defines a novice or a naïve decision maker. We have been aware of these differences in definitions during writing this paper. However, we have mainly limited ourselves to the definition of an expert as has been stated in the Free Dictionary [11], especially during the experiments of Wimbledon. To conclude, non-experts have been considered as the combination of both novices and naïve decision makers. This group has consisted of all people that do not belong to the group of experts as specified in paragraph 4.2.

2.4 Research 'experts versus non-experts'

In this paragraph, we will focus on the theoretical part of our research topic. We want to know what previous research about experts has proven. Therefore, we have analyzed several articles concerning the prediction performances of experts in relation to other groups of people. We have studied the prediction performances of different parties in a non-prediction market environment. This has been mainly meant to get a perception about the predicting performances of experts as known so far and has partly answered the following sub research question:

What have been the results so far regarding predictions of experts and non-experts?

We have found these articles through Web of Science and Google Scholar and have analyzed these five articles since they fit well with the researched topic and give us more insight in previous research on the predictive skills of experts.

The researched articles

We have analyzed the following five related scientific articles:

1. **Predicting the World Cup 2002 in soccer: Performance and Confidence of Experts and Non-Experts.** This paper has investigated the forecasting performance and confidence of experts and non-experts. Two hundred fifty one participants with four different levels of knowledge of soccer (ranging between expertise and almost ignorance) have taken part in a survey and have predicted the outcome of the first round of World Cup 2002 [23].
2. **Professional vs. Amateur Judgment Accuracy: The Case of Foreign Exchange Rates.** Forty professional and fifty seven sophisticated amateur forecasters have made one-day and one-week-ahead foreign exchange predictions in deterministic and probabilistic formats [25].
3. **Probabilistic Forecasts of Stock Prices and Earnings: the Hazards of Nascent Expertise.** Undergraduate and graduate students in finance courses have made probabilistic forecasts of the quarterly changes in the stock prices and earnings of publicly traded companies [30].

4. **Probabilistic Forecasting: An Experiment Related to the Stock Market** [31]. This article has compared the stock market predictions of five types of participants. In total, seventy two participants have performed twenty four predictions regarding the shares of twelve companies.
5. **Predicting the Outcomes of National Football League Games** [24]. This paper has evaluated power scores as predictors of the outcomes of National Football League games for the 1994–2000 seasons. The evaluation involves a comparison of forecasts generated from probit regressions based on power scores published in *The New York Times* with those of a naive model, the betting market, and the opinions of the sports editor of *The New York Times*.

We have discussed the articles by grouping relevant topics and discuss the results of the articles based on these groupings. The table for this analysis can be found in Appendix B.

General

The articles have researched the predictive ability of experts versus other groups in two main topics, namely sports results (World Cup and National Football league) and predictions in the financial markets (exchange rates and the stock market). The dates of publication of the articles vary between 1972 and 2005.

The first thing has been striking is regarding the grouping of participants: although in four of the articles the predicting performances of experts are compared with non-experts, different types of non-experts have been researched across the articles.

- In article one and four, the predictions of a group of experts have been compared with the predictions of several groups of non-experts.
- In article two, the predictions of a group of experts have been compared with the predictions of one group of non-experts
- In article three, semi-experts have been compared with non-experts
- In article five, the results of the predictions of an expert have been compared with 'power scores' and other markets, including a betting market.

Particularly, article five has compared the results of experts with other prediction tools, which has not exactly been the main goal in this research. However, it has been interesting to see that the prediction skills of a small group of experts have been being compared with a betting market or prediction market.

Participants

Another interesting finding has been the difference in the definitions of expert in the articles. In one of the articles, it has not even been discussed what the definition of an expert is. With the predictions in sports results, the main (derived) definition of expert seems to have been 'people making a living in the area or fans'. With regard to the fans: people could decide for themselves or for others if they were considered 'fans'. This matches the definition of Shanteau [27] and Hoffman [28] regarding experts, namely "those who have reached the pinnacle of their profession and are referred to by their colleagues to be the best at making decisions".

For the predictions in the financial area the experts have also been differently defined. In article two, the definition has been similar to the definition of the articles regarding sports: the experts are people that make a living in the specific area. However, article five has not defined who have been the experts and in article three 'semi-experts' are the subject of investigation. The researcher has defined semi-experts as graduate students in business.

The number of participants varies from 31 to 251. For article five, it has not been known how many have participated; we do know that in total the predictions of five experts were (separately) evaluated. In article one, two and three, the division of experts and non experts has been approximately fifty-fifty. However in article four, only ten out of seventy two participants have been defined as experts.

Unfortunately, not much can be said about the years of experience of the experts, because none of the articles mention anything about this. This means that it has not known how experienced the experts actually are.

With regard to the participants, many differences can be found in the definition of an expert, the number of participants as well as the areas the participants are experts in. We will now take a look at the experiments itself to see if they are just as different.

Experiment

The dates of the experiments more or less vary to the same extend as the publication dates. We do not believe the ranges in dates have influenced the results positively nor negatively. For every article, we have considered the definition of the experts and the knowledge the specific groups have, seems not to have changed. However, the methods in making predictions might have changed.

In the articles that have researched the predictive skills of experts in the sports area, the outcome of a competition has been predicted. However in article one, only the outcome of the first round has been predicted, while in article five 1212 predictions have been made and researched over a six year period of time. In the second article, several types of measurements have been made, namely predictions in a one-day and a one-week horizon. Furthermore, point forecasts, directional forecasts and interval forecasts are made by both groups. With point forecasts, the participants were asked to write down the value they thought would be realized at a given period. In the interval forecasts, the participants were asked to write down the lowest and the highest value that this rate could take on with 90% confidence. With the directional forecast, the participants were asked to indicate whether the value that will be realized within a given period would increase or not, compared with the value observed today. After predicting this direction of change, they were asked to indicate the probability that the forecast would indeed be correct [25]. A total of 300 predictions have been made. The third article has experimented with forecasting the change in earning and stock prices of thirty one companies. A total of 62 predictions have been made regarding a three months period. In article 4, the buying stock prices of twelve shares in a two week period has been predicted in Stockholm. In total 120 predictions have been made.

While in the experiment of the second article, information about the experiment and forecasting in general has been provided to the participants, in the experiment of the third article (in addition to general information) information about the revenues and share prices of the target companies has been provided to the participants of the experiment. In the fourth article, only instructions were given to the participants about how to forecast. The expert that has participated in the fifth article was provided with the information of the power score. The intention was to be able to see whether the expert may be able to make a better prediction based on his knowledge and the latest news of the (players of the) National Football League. In the first article, separate (non-expert) groups were made which were given either no information or ques about all teams. The researcher wanted to see whether there was a difference in the performance of the non-experts with and without information.

In three out of five experiments none of the participants were given financial incentives with regard to their participation and performances. However, in the first article only the sport journalists and soccer coaches have not received financial compensation for participation or performance. The other groups have received a financial incentive for participating and making accurate predictions. Unfortunately, it is not clear what amount has been promised. In the third article, all participants received $ 5 for participating and could win $ 30 to $ 5 when making the best predictions. In the experiments of the fourth article, no financial incentives were given. However, the students participating were allowed a seminar off from their course requirements which might also be an incentive for the students to participate.

Results of experiment

Only in the experiments in the second article, the experts have performed significantly better than the non-experts, but only in some cases. In general, they outperformed the non-experts in the predictions of the one-week horizon. With regard to the interval forecasts, there was no significant difference between the performances of the experts and the non-experts. Only with directional forecasts, both groups made better one- week predictions than one-day predictions. In the other two types of forecasts the one-day predictions were always better in both groups.

In the other four articles, the non-experts performed equal or better than the experts. The non-experts of the first article made slightly - but not significantly - better forecasts than the experts. Both experts and non-experts outperformed chance, which is based on the assumption that, for example 'both teams have an equal opportunity to win'. However, a simple rule outperformed the forecasts of both groups. This rule was based on the assumption that – as discussed in article 5 – 'home team wins'. With regard to the provided information: the non-experts with information did not outperform the non-experts without information.

Interestingly, the novices of the third article have made significantly better predictions than the semi-experts. However, they also were outperformed by several hypothetical constant forecasters. In the fourth article, experts were outperformed by the statisticians but performed better than the university business student and teacher and the bankers. The difficulty here is that the university business student and teacher (as well as the bankers) could have been considered as 'experts' in other research. To that respect, only the statisticians are no 'experts' in the stock market and they outperform all other groups of experts. In the last article, the betting market is the best predictor when comparing it to power scores, a sports editor and the assumption that 'home team wins'. According to this article, a betting market – which might be a prediction market – outperforms a single expert, which is consistent with Surowieki's [10] statement.

3. Studying Performance of Experts versus Non-Experts

We will now continue with describing the methodology that has been used to be able to answer our main research question. We will discuss the research approach, the research methods and the matching research techniques.

We have performed different types of analysis to answer all sub research question and eventually be able to answer the main research question. The table below gives an overview on which sources have answered which sub research questions. The main research question has been answered by applying all three sources of data.

	Experiment Wimbledon 2009	Obtained data EC2008 and AEX-index	Survey Wimbledon
Research Question 1		√	
Research Question 2			√
Research Question 3	√	√	
Research Question 4	√	√	
Research Question 5			√

Table 2: Methodology versus research questions

3.1 Experiment Wimbledon

There is not much research available on the topic of prediction markets. In particular, the role of experts within prediction markets has not yet been researched. Therefore, it has been necessary to set up our own experimental environment of two prediction markets. By doing so, we were able perform an analysis in which we could compare the accuracy of predictions of experts versus non-experts in a prediction market environment.

Research approach

We have set up two prediction markets: one for experts and one for non-experts and have defined an 'expert' according to the definition in the free dictionary [11]:

A person with a high degree of skill in or knowledge of a certain subject.

In chapter four, we have made a further specification on which characteristic an expert should have to be able to participate in our 'expert' prediction market. We have posted the same questions in the two prediction markets to be able to make a comparison of the results of the expert and the non-expert of the researched area.

As can be seen in table 3, we have mainly answered sub research question three and four with our experiments:

- *Which group makes better predictions in which situation(s)?*
- *What are the differences in results with prediction markets comparing them to 'normal' predictions?*

Research methods

We have performed statistical analysis to be able to examine the data obtained from the experiments and the obtained data. Since the sampling distributions of these statistics are not normal distributed, all accuracy statistics are non-parametric.

The samples of populations that have been studied are – for the experiment as well as the obtained data – a group of experts versus a group of non-experts. We have set up an experimental environment with a control group – the 'non-experts'- to see whether there is a significant difference between the predictions made by the group observed and the control group. We have analyzed the data using (i) the Median Absolute Percentage Error, (ii) the Mann-Whitney test and (iii) the chi-square test of association.

Using three different types of analysis we have been able to draw well founded conclusions with regard to the research questions.

Research techniques

The null hypothesis (H_0) is – as commonly used in statistics – the hypothesis of 'no effect', meaning there is no difference between the prediction market of the non-experts and the experts:

$$H_0: \mu_1 = \mu_2$$

The alternative hypothesis (H_1) is the statistical equivalent of the scientific hypothesis and states that there is a difference between the results of the prediction market of the experts and the non-experts:

$$H_1: \mu_1 \neq \mu_2$$

We have tested in which situations H_0 is accepted and in which it is rejected.

As stated earlier in this paragraph, the data has been researched based on the following dependant variables:

- **The Chi-square test of association**: the right answer of the prediction markets of the experts versus the non-experts at closing date has been compared. Value '1' has been assigned if the stock value of the right answer has the highest price and probability and value '0' has been assigned if the stock value of the right answer does not have the highest price and probability.
- **The Mann-Whitney test**: the value of the stock of the right answer at the closing date and average wealth of the experts versus the non-experts has been compared to each other.
- **The Median Absolute Percentage Error**: the median error percentages of the experts have been compared with the median error percentages of the non-experts.

We have used the chi-square test of association, since this is best applicable when a two-group experiment yields two independent samples of nominal data, for example either a pass or a fail [19]. Hereby, we have been able to determine which of the two groups has made the best predictions in absolute terms. The values of the stocks and the average wealth have also been compared with each other to be able to detect significant differences in this area.

In addition, we have performed the Mann-Whitney test to determine whether the difference between the values is significant.

$$U = n_1 n_2 + \frac{n_2(n_2 + 1}{2} - \sum_{i = n_1+1}^{n_2} R_i$$

U = Mann-Whitney U-Test

n_1 = sample size one

n_2 = sample size two

R_i = rank of the sample size

Nonparametric tests, such as the Mann-Whitney test, do not make specific assumptions about population distributions. The Mann-Whitney test is an alternative to the independent samples *t* test [19]. The value of the stocks and the average wealth has also been compared using the Mann-Whitney test to be able to detect significant differences in this area.

The significance level for all statistical research has been set at 5 %, as commonly used in statistics.

Armstrong and Collopy have analyzed nearly 200 economic time series and judged error measures on reliability, construct validity, sensitivity to small changes, protection against outliers, and their relationship to decision making. To select among forecasting methods, the Median Relative Absolute Error (MdRAE) and the Median Absolute Percentage Error (MdAPE) are recommended [20]. We decided to use the MdAPE since the MdRAE compares the results with the random walk, which is not present in our data.

The absolute percentage error (APE) for a particular forecasting method for a given horizon of a particular series is defined as [20]:

$$APE_{m,h,s} \quad \frac{F_{m,h,s} - A_{h,s}}{A_{h,s}}$$

m = the forecasting method
h = the horizon being forecast
s = the series being forecast
$F_{m,h,s}$ = the forecast from method m for horizon h of series s
$A_{h,s}$ = the actual value at horizon h of series s
H = the number of horizons to be forecast
S = the number of series being summarized

The Absolute Percentage Errors for a particular forecasting method are summarized across series by [20]:

MdAPE = Observation (S + 1)/2 if S is odd, or S/2 if S is even

The best forecast is achieved when MdAPE is zero, since in the ideal case $F_{m,h,s} = A_{h,s}$.

These following dependent variables have been analyzed using the following independent variables:

- When type of question is 1 (‘who wins’) and when type of question is 2 (‘in how many sets’).
- With number of possible answers are two and with number of answers are three.
- When information of the non-experts is ‘1’ which means information is given, but no additional information may be searched, ‘2‘ which means no information is given, but it may be searched and ‘3’ which means no information is given and it may not be searched.
- When the number of participants of the experts and the non-experts belongs to the same category or not. Christianson has divided the number of participants into categories in which the accuracy of the predictions are comparable [14].

	Dependent variables		
Independent variables	**Stock value**	**Right answer**	**Average wealth**
Type of question	Who wins?	Who wins?	Who wins?
	How many sets?	How many sets?	How many sets?
Number of answers	Two	Two	Two
	Three	Three	Three
Information	Limited information	Limited information	Limited information
	Own choice	Own choice	Own choice
	No information	No information	No information
Cases	Same scale	Same scale	Same scale
	All	All	All

Table 3: Relevant variables Wimbledon Case

These combinations have been compared to be able to see whether it makes a difference when looking at all available cases and looking at only the cases where the experts and the non-experts are in the same scale of participants [14]. These have been summarized in table 3.

3.2 Obtained data EC2008 and AEX-index

The obtained data has been analyzed to support the results that have been found during the analysis of related articles in paragraph 2.4. We have performed this analysis to be able to answer the following research questions:

- *What have been the results so far regarding predictions of experts and non-experts?*
- *Which group makes better predictions in which situation(s)?*
- *What are the differences in results with prediction markets comparing them to 'normal' predictions?*

Research Methods and Research Techniques

The research method and technique of the obtained data has been the same as the analysis technique for the experiment as described in paragraph 3.1, with the exception of the following:

AEX-index

For the analysis of the AEX-index:

- There was no 'Stock value', so the opinions of both groups have been converted to 'Percentages' and compared with each other.
- The 'Right answer', this means that value '1' has been assigned when the stock value of the right answer had the highest price and probability and value '0' has been assigned when the stock value of the right answer did not have the highest price and probability. This value has been derived from the percentages of the previous bullet.
- There has been no 'Average wealth'. This variable has therefore been ruled out.
- The difference in 'Type of question' has been the one- month prediction and the six-month prediction.
- There was no difference in the 'Number of answers', 'Type of information' and 'Cases'. The number of answers was the same, there has been no difference in type of information and there have been always more than 15 traders [14].

We have summarized this in the following table:

	Dependent variables		
Independent variables	**Percentage**	**Right answer**	**Average wealth**
Type of prediction	One Month	One Month	One Month
	Six Months	Six Months	Six Months
	Both	Both	Both

Table 4: Relevant variables data AEX-index

EC2008

The differences of the analysis of the data from EC2008 compared to the data from the AEX-index have been as follows:

- The 'Type of prediction' has been the overall result of the competitions ('who wins?') and the score (number of goals for both teams).

	Dependent variables		
Independent variables	**Percentage**	**Right answer**	**Average wealth**
Type of question	Result	Result	Result
	Score	Score	Score
	Both	Both	Both

Table 5: Relevant variables data EC2008

The analysis of the obtained data of both sources has in fact been a simplification of the analysis of the experiment.

Selecting cases

First, we will explain our research approach; how we have selected the cases that have been studied and how we have collected the researched data.

EC2008

The results of the EC2008 pool have been obtained from a colleague of one of the researchers after a discussion about our research. Since the colleague organized the soccer pool in 2008, he had all the data that was required for the research. We only had to find out which of the participants were experts and which were non-experts.

AEX-index

A member of B & R Beurs had directed us to a monthly article the in section 'Beurs' of the newspaper 'De Pers' that was published. After searching this article in the archives of www.depers.nl, we found that this article was deducted from the stock market website www.iex.nl. The monthly survey was performed by Corne van Zeijl (for the experts) and Arend Jan Kamp (for the www.iex.nl visitors) and we contacted them both by email. Both were very willing to provide us with the data. We were the first ones ever making an overall analysis of this data.

Collecting the field data

EC2008

As mentioned earlier we have received data from a colleague of 'Quion B.V. Group' who has organized a pool for the European Championship of soccer for 2008. To make sure which of the participants could be marked as 'experts' we have asked questions to them by email (see Appendix A.1). This enabled us to group the participants into 'experts' and 'non-experts'.

Out of the 82 participants, we were able to categorize 50 of them. The remaining 32 participants were not included in the research, because we were not able to group them as 'experts' or 'non-experts'. After this, we were able to analyse the results.

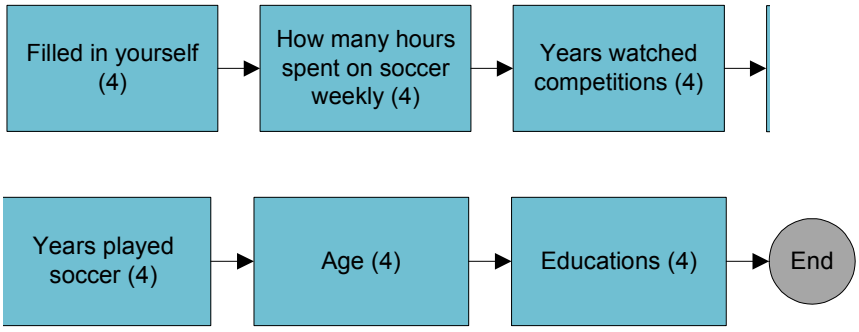

Figure 1: Questions EC2008 participants

See Appendix D.2 for the rules that were applied to the soccer pool. We have decided not to include the assigned points in the pool per correct answer to the research. We believe this would decrease the trustworthiness of the results; the points were not always assigned consistently and complicated rules have made it less transparent. There are also bonus points assigned to six additional questions.

AEX-index

The predictions of the Bull-Bear contest – which is the survey that has been published every month by www.iex.nl in which all internet users indicate what will happen to the AEX-index the coming period – as well as the predictions made by the experts were send to us. However, we had some questions about how the data was collected and how to interpret the data. Fortunately, Mr. Kamp as well as Mr. Van Zeijl has been willing to answer additional questions.

Due to the fact that the provided data was not always complete, we decided to focus our research on two out of six questions:

1. How do you think the stock market (AEX) will develop the following month?
    a. Upwards (more than +2 per cent)
    b. Neutral (between -1 and +2 per cent)
    c. Downwards (more than -1 per cent)
2. How do you think the stock market (AEX) will develop the following 6 months?
    a. Upwards (more than +6 per cent)
    b. Neutral (between -3 and +6 per cent)
    c. Downwards (more than -3 per cent)

For question 1, we have analyzed the data for period December 2001 through June 2009, and we have analyzed the data for period December 2001 through December 2008 for question 2.

The following has been clarified by Mr. Van Zeijl and Mr. Van Kamp:

- Both groups were asked exactly the same questions.
- All questions were multiple choice questions.
- The experts could fill in their answers once and were able to change them within the set time period. However this almost never happened. The Bull-Bear participants were not able to change their answers after submitting them. They could only fill in the survey once, but could log in at another computer and fill in the survey again. There has been no data available of whether this has happened on a regular basis.
- The experts were mostly acquaintances of Mr. Van Zeijl. He decided whether a person was an expert. Again, this has been consistent with the definitions of Shanteau and Steward [8] and Hoffman *et al* [17]. Mr. Van Zeijls' definition of an expert has been as follows: when someone makes or has made a living in the stock market industry as an investor. The Bull-Bear participants were all internet-users that wanted to participate.

- Although the opening and closing dates for the Bull-Bear contests were strict (it opens after the market has closed at the last trading day of the month and closes when the stock market opens at the first trading day of the following month) this has not been the case with the experts; Mr. Van Zeijl had a variation of plus and minus one day in addition to the rules as explained for the Bull/Bear contest. However, according to Mr. Van Zeijl it was more likely to happen that the experts handed in their prediction before the stock market opened in the next month than after the stock market opened in the following month.
- The announcements for the Bull-Bear contest were on the website of www.iex.nl and the experts were contacted by email.
- The results of the Bull-Bear participants could not be consulted until the Bull-Bear survey was closed. Theoretically, the experts were able to contact each other about their predictions. However, there is no data available whether this has happened or not.

Table 6 gives an overview of the (differences between the) characteristics of how both groups are questioned.

	Bull Bear contest	**Experts**
Questions	Identical	
Type of questions	Multiple choice	
Able to fill in	Once, but could avoid these rules and fill it in several times	Once
Able to change	No	Yes
Participants	All internet users	Experts as determined by Mr. Van Zeijl
Opening date	When stock market closes at the last trading day of the month	When stock market closes at the last trading day of the month minus 1 day
Closing date	When the stock market opens at the first trading day of the month	When the stock market opens at the first trading day of the month plus one day
Announcement	On the website	By email
Access to Bull- Bear data in advance?	No	
Access to expert predictions in advance	No	Theoretically, this could be. However it is not known whether this happens and how often

Table 6: Overview characteristics AEX-index

The actual result of the AEX-index that month has been included with this data, so we have been able to compare the actual value of the AEX-index with the percentages of people that had predicted this correctly (see Appendix D.5).

3.3 Survey research Wimbledon

A survey research has been performed since we have noticed some differences in the way the prediction market was approached by the experts compared with the non-experts. We have set up a survey that has been sent to the participant and possible participants after the experiment had ended. Basically, we have answered the following sub research questions with our survey research:

- *How can we define the characteristics of both the experts and the non-experts and what are the similarities and differences?*
- *What are the differences in the way both groups make decisions?*

Research approach

We have set up a *probability web survey* which has been performed on a probability sample of units that has been obtained from a sampling frame satisfactory covering the target population. The type of probability web survey was a *list-based survey of high coverage populations*, which means surveys that are implemented on samples of students, members of organizations or employees, etcetera [6]. The survey was aimed at a specific group of people, namely the (possible) participants of the prediction market. However, we would like to make conclusions about the behaviour of experts and non-experts in general in a prediction market environment.

Research Methods

We have sent the survey to all possible participants of the prediction markets. This has made under coverage – which means that a segment of the target population is missed that differs on key measurements from the surveyed population– less likely to occur, since all participants have had the chance to give their opinion. However, there has still been a chance that a specific type of participants has responded less or more than another group. This may lead to misleading or biased estimates of population quantities [6]. Fortunately, we did not have to deal with over coverage (individuals not in the target population are included in the sampling frame), since we have not included individuals in the survey mailing list that are not in the target population.

Research Techniques

We have performed *traditional analysis* for the survey data. The survey questions have provided for a simple data set which is applicable to this type of analysis [6]. However, we have again separated the data of the experts from the non-experts and compare the results to see whether there are interesting differences between them.

Selecting cases for the survey

We will now explain how we have selected the participants for the survey, how we have designed the survey and how we actually collected the survey results from the respondents.

Selecting participants for survey

Naturally, the people that have received an email to participate in one of the prediction markets have been the targeting group for the survey. The goal has been to get more insight in why people did (not) participate, how they participated in the prediction market and how the decision making process took place. We believed that the participants (and even the non-participants) could give us valuable information about their participation.

After testing this survey and having fine-tuned the questions, we have presented the survey to all the people that had received our emails – requesting to participate in the prediction market experiments – together with the final email regarding the results of the Wimbledon tournament.

Survey design

The survey was designed to question both actual traders of the prediction market for Wimbledon 2009 as well as people that had not participated in the prediction market. The research (sub)-questions were not directly used for the survey because we didn't want the participants of the survey to know what our exact research questions were. At Appendices A.5 and A.6 all survey questions are included. For people that had not participated in the prediction market we created additional questions in order to understand why they had not participated.

Figure 2 describes the flow of the survey for the experts as well as the non-experts. The numbers behind the questions represent the related (sub-)research question that has been answered by the survey question.

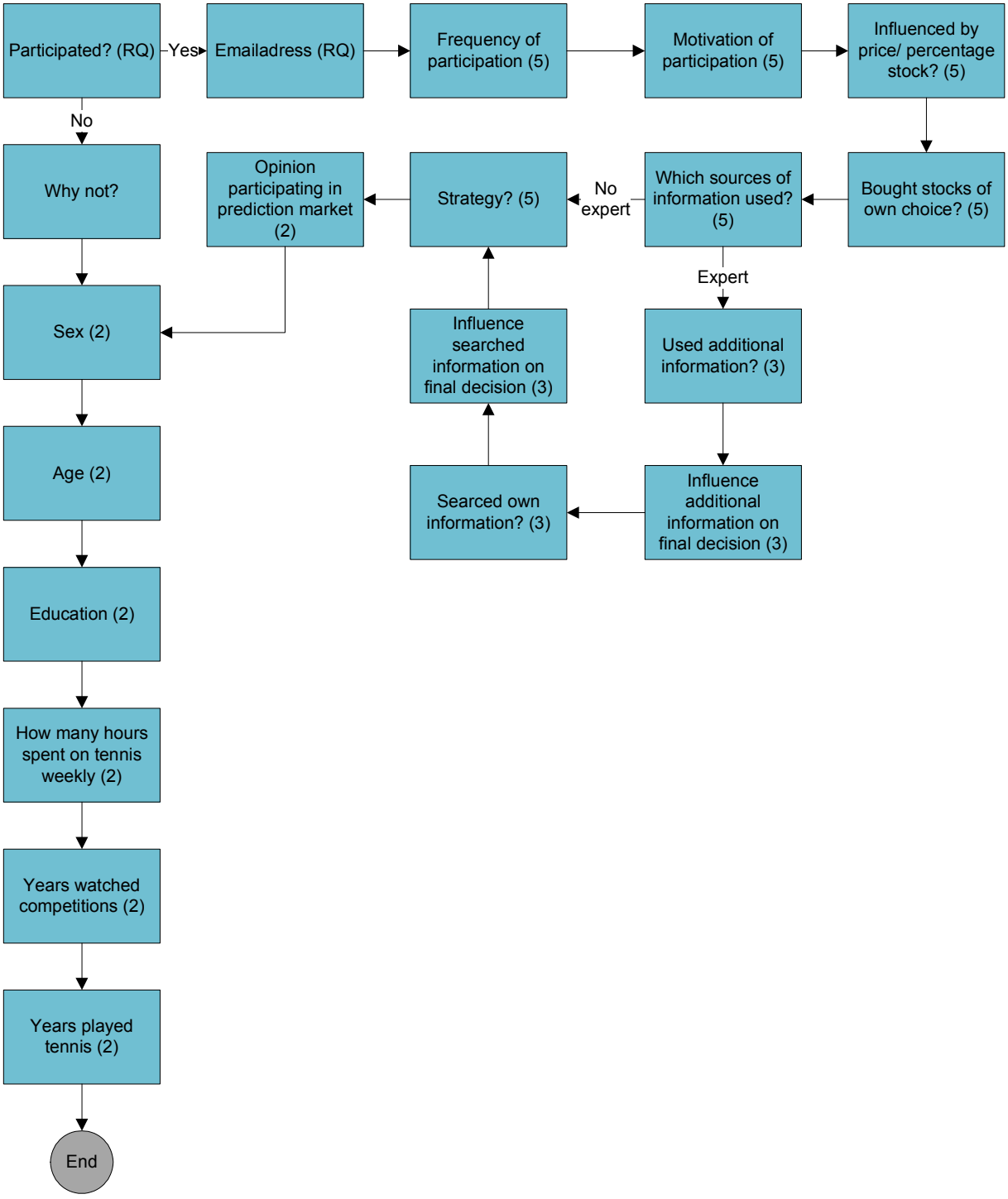

Figure 2: Overview survey case Wimbledon 2009

The process

The survey form was tested and verified by five people. This was done to make sure that the question were understandable, unambiguous and to verify how long it would take to finish the survey. The following comments have been taken into consideration and ultimately resulted in changes in the survey:

- Add a question about whether the participants determined their own amount of stocks or only used the option of the predefined number of stocks.
- Add the question: 'What was your purpose when participating?
- Add the answer: 'Not interested in participating' to question 2.
- Add the answer: 'Yes, when an answer had a high price, I did not buy or bought less of that stock' to question 6.
- Minor grammatical adjustments.

In general, the testers were satisfied with the understand ability of the survey as formulated.

Collecting the survey data

We have sent an email to 25 experts and 250 non-experts. The latter group has mostly contained of the students that had not responded. In the email was a link which redirected the participants to an internet survey. After posting the email with the request for participation in the survey we waited to see who responded. The participants had four days to answer the survey, from the 8th until the 12th of July 2009. After that, we gave the respondents an additional week to fill in the survey. This additional week was meant to get as much response as possible.

The final deadline has been set at 19th of July 2009 (eleven days after the start). The results of the survey were published online only to the creator of the survey. We used this information to create the survey result overview of Appendix A.4. Twelve experts and twenty three non-experts-participants responded to the survey.

After the analysis of these three sources of data, a cross case analysis [21] has been performed to be able to draw the final conclusions on the main research question. With the cross case analysis, we have been able to compare the results from the different researched sources, consider their similarities and differences and make well grounded conclusions on our research question.

For the analysis process, we followed three steps:

1. Data analysis: We have used within-case analysis to reduce the data [22]. We did this separately for each of the cases. Here, we compared the data that we collected to see whether it fits the theory that we used. The within-case analysis shows whether the data proves previous findings or not. In some cases it brought up new information.
2. Data display: We used cross-case analysis to display the data [22]. This has been used to find similarities with the results of step 1, the data analysis and presents new patterns in the data.
3. Conclusion drawing and verification. The conclusions of our analysis can be found in chapter seven.

4. Designing the Wimbledon experiment

Using experiments, we have researched predictions markets in the tennis area, namely the Wimbledon competition of 2009. We have chosen this topic since it is a very suitable area for prediction markets: a limited amount of answers is possible, we know beforehand when the answer to the question is known and there is a relatively short run time before the answer is known. Specifically to this research, it is also suitable because there is a sufficient amount of experts available in this area.

The results of the prediction markets of Wimbledon can also be applied to the enterprise prediction market. Since there has not been found any evidence of differences between the results of public prediction markets versus enterprise prediction markets. In fact, the predictive performances of both types of prediction markets are quite striking [5]. In addition, no difference can be reported between experts in different areas of expertise (see paragraph 2.3).

4.1 Experimental environment

We have performed an experiment with a group of experts. This group of people are tennis experts who have predicted the outcome of the Wimbledon competitions during our experiment. This has been our experimental group.

For the experimental group, a control group has been set up to compare results. This control group consisted of randomly selected people, representing the 'non-experts'. We have compared the answers given by the experimental as well as the control group to the actual outcome to be able to see which group makes the best predictions.

The independent variable with these experiments was the expertise of both groups. Expertise was always present in the group of participants of the experimental groups and was not present in the group of participants of the control group.

During the Wimbledon tournament, the first four rounds and the quarter finale we have asked eight questions per round. At the semi-finals and finale, we have asked respectively six and four questions. Thus, a total of 42 predictions have been performed over a period of two and a half weeks. The experiments have not been performed double-blinded; we believe the experiments are not of such nature that the participants are able to prejudge the results. Double blinded means that the participants are randomly addressed to the experimental and control group without the researchers do not know who is in which group. Also, the fact that the experts have specific qualities – namely expertise – that requires they should be in the same group, makes it impossible to assign them at random, without the researchers to know who is in which group.

Another issue in this perspective is that we were not able to perform randomization, which means assigning the participant randomly to either the experimental group or the control group. However, we do not think this is necessary since the only qualification of the participants of the experimental group is they should be experts in the concerning area. Variables as age, sex and educational background have not been seen as relevant in this experiment and therefore less important for our research. However, we have asked the participants of both groups about their general background for informational reasons.

4.2 Participants

In chapter two, we have described different definitions of an expert. In this paragraph, we will explain what kind of participants we have considered as experts and what kind of participants we have defined as the non-experts in our experiments.

Experts

We have defined the following characteristics for a person essential to be considered an expert:

- A minimum of three years experience in practice of the field or subject.
- A minimum of three years experience in study of the field or subject.
- The person has to practice and study the field or subject minimally on a weekly basis.
- Preferably, the person in question has made his profession in the area of the particular field or subject.

We have chosen three years experience in both practice and study, because the definition says ‘both study and practice **over the years**’. It does not really state how many years a person should have that experience. Although arbitrary, we have considered three years as the minimum to be on the safe side. In addition to the third variable – requiring people to practice and study the field on a weekly basis - we are confident that we have performed the experiments with the right (groups of) people.

Our last variable has not been an absolute requirement to be able to call someone an expert. Previous research has investigated three types of experts: sport journalists, soccer fans, and soccer coaches. Despite these different backgrounds, the subgroups gave similar responses [13]. Someone may very well be an expert in a field or subject without it being his profession. However, we have searched people that have made their profession of the field and wanted to participate in our experiment. Unfortunately, this has not succeeded.

There has been a risk involved in the research regarding the experts, namely that we have not been sure the people that state to be experts actually had the experience they claimed to have had. We have asked experts we know to introduce us to other experts. We believe this has made it more trustworthy that these people told the truth and has also been consistent with the definition of an expert as made by Shanteau [8] and Hoffman *et al* [17]. In general, we have assumed that the information people have given us was reliable, unless we were given a reason to believe otherwise.

The Non-experts

The intention has been that the non-expert group consisted of students from the Erasmus University Rotterdam and the current participants of www.inklingmarkets.com.

4.3 Questions

When the match started, the prediction market was closed. We have made this decision, because we wanted to rule out the effect of developments during the match on the prediction market. We do not believe it is realistic to assume that the non-experts will adjust their answer of the questions in the prediction market during the match. They might not even bother to watch the game. However, the experts are more likely to follow the actual outcome of the prediction, since they are more interested in the subject.

For the prediction market, the following types of questions have been asked to both the non-experts and the experts. However, only the non-experts were provided with rules about the information that was allowed to be used to answer the questions.

1a. First, we have given the non-experts information through email about the players about their historic performances. The non-experts are not allowed to search for additional information and have to answer the question: 'Will player A or B win this match?

1b. The same information as given in 1a. can be used by the non-experts to answer the following question: 'In how many matches will player A or B (dependant on previous answer) win?' Again, the non-experts were not allowed to search for additional information.

2a. We have asked the question 'Will player X or Y win this match?' but this time, we have not given any information to the non-experts. The non-experts were allowed to search information about previous achievements of the players, if they wanted to.
2b. In addition, we have asked the question 'In how many matches will player X or Y (dependant on previous answer) win?' but we have not given any information. The participants again were allowed to search information about previous achievements of the players, if they wanted to.

3a. We have asked the question 'Will player F or G win this match?' No additional information has been given and the non-experts were not allowed to search for any information about the players either.
3b. We have asked the question 'In how many matches will player F or G (dependant on previous answer) win?' Again, no additional information has been given and the non-experts were not allowed to search any information either.

Each round the non-experts were given extra information, no information or the opportunity to search for themselves. The experts were given no instructions: they were able to do whatever they wanted before predicting the answers. This was done to be able to let the natural decision making process of the experts run its course, while influencing the non-experts to see if it made any difference if (no) information was provided or even restricted. Later on, we have asked both groups how they made use of the information sources available through a survey.

We have selected the matches – about which questions were asked – randomly, so no personal preferences of the researchers were reflected upon the prediction markets. Both prediction markets contained the same questions each round.

We have contacted the students through email and have set up a public prediction market, allowing everyone to participate in the prediction market for the control group.

However, during the experiments, we noted that the two groups of non-experts had a very low response rate. Since we obviously wanted the experiments to succeed, we contacted our colleagues and have asked them to participate as non-experts. During the whole experiment, we have sent the emails to all three groups to be able to get enough response from the non-experts.

4.4 Number of participants

Previous research has shown that a prediction market already gives an accurate outcome with a minimum of 16 participants [13]. We have set this as the desired amount of participants for each prediction market. However, Christiansen [14] has formulated several group sizes in which the results of a prediction market are comparably reliable:

- More than 15 traders
- 11 to 15 traders
- Less than 11 traders

The more participants, the more reliable the prediction is. We have compared the results of the non-experts and experts if both groups were categorized in the same group and if both groups were not in the same group as defined by Christianson. This to prevent to draw conclusions based on another variable, namely the number of participants.

4.5 Experimental process

At 22nd of June 2009, the Wimbledon tournament has started. We have contacted tennis clubs, but also acquaintances and friends who practice and watch tennis matches to be able to get connections at tennis clubs. We have posted questions every other day (and later on a daily basis) about the outcome of a competition. The competition – and therefore also the experiment – has ended at the 5th of July 2009.

We have registered on an experimental environment – namely www.inklingmarkets.com, in which we have implemented two prediction markets per round. One prediction market has been set up for the experts and the other one has been set up for the non-experts. Every other day, eight questions were announced for the two experimental groups by email. The prediction market for the experts was private, which means only invited people could enter, trade and see the results of the prediction market. The prediction market for the non-experts was public; we assumed that experts were not interested in the predictions of the non-experts.

We have stimulated the two groups to participate by stressing out the importance of the experiment in the beginning and by sending a reminding email near the closing date of the prediction market. Also, we have kept track of the best predictor (making the largest amount of money during the whole period). The top three was announced to receive a present. The software on www.inklingmarkets.com keeps track of this. We have formulated the questions as clearly as possible and have limited the number of questions to eight per round. This was to minimize the time participants had to spend on the experiment and to make the threshold to participate as low as possible.

Every round, each trader got the same amount of money. We wanted every participant to start off with the same chances to generate profits. If the participants continued trading with their generated money from the previous round, they would be able to trade very large amounts when they had bought shares from the right answer or would not be able to recover when they had traded on the wrong answer in the first round.

According to previous research [2], no significant difference has been found in the accuracy of a prediction market using real money or play money. For this reason, we have decided to use play money. However, we have raffled a present among the overall top three of the participants in terms of gained play money.

The following steps have been taken for each round:

1. Announcement to the experts and non-experts of the posted question(s) through email.
2. Reminder email 12 hours before the prediction markets close.
3. Email including the correct answer(s) of the earlier posted questions.

This cycle has been repeated seven times. For every cycle, the questions have been analyzed and the email with the results has been sent before posting the new questions. This way, it has been possible to keep the participants posted about their progress with regard to the other participants.

The results of the experiments of Wimbledon have been analyzed to see which group gives the best answers and under which circumstances.

5. Case Wimbledon 2009

In this chapter, we will first verify whether we deal with an efficient market. After that, we will analyze the data as gained from the experiments by ordering the data. The results of the groups of non-experts and experts are compared with each other, thus we can conclude whether one group makes significantly better predictions than the other group.

We will also report on the results regarding the survey as performed among all possible participants after the experiment of Wimbledon.

5.1 Market efficiency

First, we have researched whether the market we use is an efficient market. An efficient market is a market in which prices always "fully reflect" available information. According to Fama [29], sufficient conditions for capital market efficiency are markets in which (i) there are no transaction costs in trading securities, (ii) all information is costless available to all market participants and (iii) all participants agree on the implications of current information for the current price and distributions of future prices of each security. When these three conditions are not met it does not necessarily mean that the market is inefficient; they are merely potential sources of market inefficiency [29]

As mentioned earlier, we have researched the non-experts in three types of situations and have asked two questions per situation per round:

1. Provide the non-expert with 'additional information' (Appendix C.2) he also may seek for (relevant) information.
2. Provide the non-expert with no information; he may not seek for (relevant) information.
3. Provide the non-expert with no information; he may seek for (relevant) information.

The experts had no restrictions in searching information during the whole experimental period.

In situation 1 and 3, we may speak of an efficient market. Although in the first situation, information is provided to the non-experts, the expert may also search for or already know this information. In the third situation, both groups start with the same information. While the experts might already know more about the players, the non-experts are allowed to search information. This information is costless available to all. The non-experts might not be able to search for information in the second situation and we could therefore say that there is no market efficiency in this situation. We have researched whether this influences the accuracy of the prediction to be able to rule out the possibility that the differences in accuracy between the prediction markets are caused by the fact that we do not deal with an efficient market.

With prediction markets, no transaction costs are charged. Only the usual costs from a prediction market are applicable. For example when someone buys shares from a certain answer at $ 55 per share and during the trading period he might change his mind and wants to sell the shares. When the shares devaluated to $ 45 per share, he will lose ($ 55 - $ 45) * the amount of shares that have been bought.

Whether the participants are fully satisfied with the market price is not entirely known. It could be that participants wanted to buy more stocks from answer A, but might find the shares are too expensive. However, the shares that have been bought were bought at an agreed price.

5.2 Experiment Wimbledon 2008

We will now discuss the results as derived from the experiments as performed during the Wimbledon competitions of 2009.

General

In total 15 experts and 18 non-experts have participated, although many of them were not able to participate in the prediction market every round. In paragraph 5.3, we will discuss the reasons why the participants were not able to join every time.

For every round (eight questions per round) each participant has been able to spend $ 5000 with buying shares. The prediction market of the experts was private, so people could not participate or even see the prediction market unless they were personally invited by the researchers. This was to prevent the non-experts to access the stock values of the experts' prediction market. The other prediction market was public; anyone that was registered on www.inklingmarkets.com could make predictions. After the competitions, the correct answer and the wealth of every participant has been communicated by email.

Overall comparison

The significance of the difference of the earlier mentioned (independent) values is determined by the Mann-Whitney U-Test.

Average wealth

In figure 3, the x-axis represents all predictions (or questions) during the experiment. At the y-axis, the average amount of wealth per participant of the group of experts and non-experts is represented. The average wealth of the two groups is as follows:

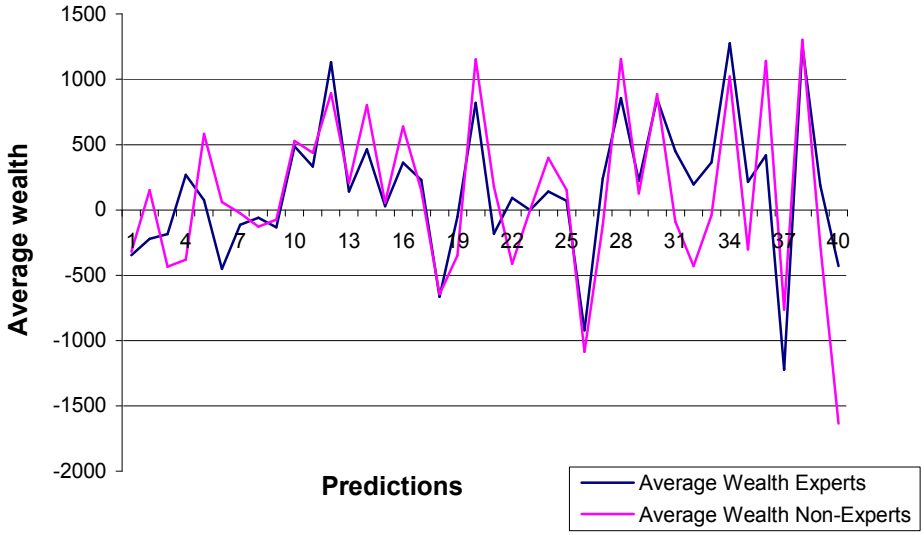

Figure 3: Average wealth experts and non-experts per prediction

When performing the Mann-Whitney test on the average wealth of both groups we are able to see that there is no significant difference between the two groups.

Stock value

The figure of the stock value of the correct answers per prediction of both groups looks as follows:

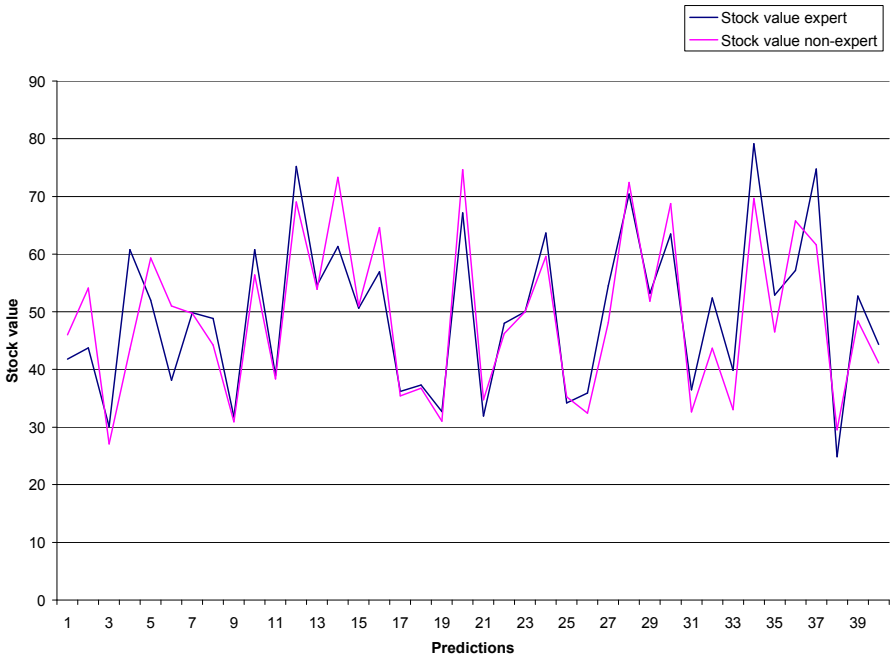

Figure 4: Stock value experts and non-experts per prediction

Also with regard to the stock value, there is no significant difference between the performances of the experts and of the non-experts. Nevertheless, it seems that the difference between the predictions of experts and non-experts is larger until the ninth prediction in favour of the non-experts (see figure 2). After that, the wonder of both lines is rather similar.

Table 8 shows the results of performing the Mann-Whitney test on the average wealth and stock value of the two groups. We have looked at the exact p-values instead of the asymptotic ones. This is recommended when using rather small samples [19]. The p-value should be 0.05 or lower to be able to prove a significant difference between the stock value and average wealth of experts and non-experts, which is not the case. This means that based on table 8, there is no significant difference between the value of the share of the right answer and of the average wealth of a group of experts and of a group of non-experts.

Test Statistics[a]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	721.000	707.000
Wilcoxon W	1501.000	1487.000
Z	-.395	-.535
Asymp. Sig. (2-tailed)	.693	.593
Exact Sig. (2-tailed)	.696	.598
Exact Sig. (1-tailed)	.348	.299
Point Probability	.002	.003

a. Grouping Variable: Type

Table 7: Mann-Whitney Test 'Average wealth' and 'Stock value'

Correct answers

As can be seen in figure 5, there is a difference between the amount of correct answers of the experts when compared with the amount of correct answers of the non-experts.

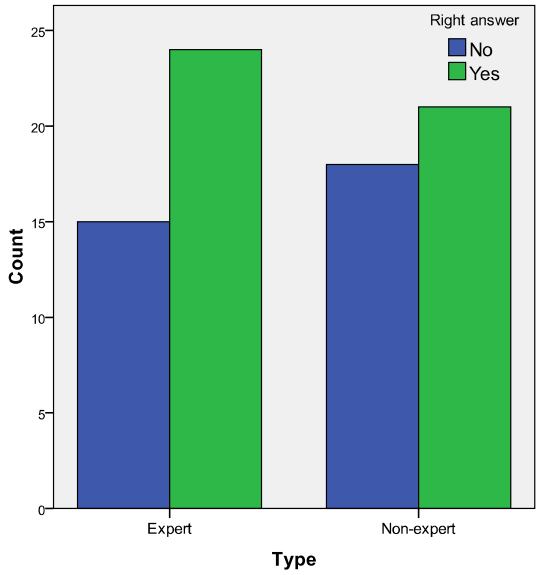

Figure 5: Number of correct answers for experts and non-experts

However, this is not a significant difference as can be seen in table 8. Chi-square has a p-value 0.647, while the difference is significant at a p-value of 0.05 or less.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.473[a]	1	.492	.647	.324	
Continuity Correction[b]	.210	1	.647			
Likelihood Ratio	.473	1	.491	.647	.324	
Fisher's Exact Test				.647	.324	
Linear-by-Linear Association	.467[c]	1	.495	.647	.324	.144
N of Valid Cases	78					

Table 8: Significance difference number of correct answers experts versus non-experts

Median Absolute Percentage Error

Figure 6 contains all Absolute Percentage Error (APE) values of both groups and gives an overview of the differences in errors. Since the participants could never over-predict the correct answer (the stock value could not be higher than 100 per cent) all values are negative values with regard to the actual value. Again, a larger difference seems to occur with the first 9 predictions in favour of the non-experts.

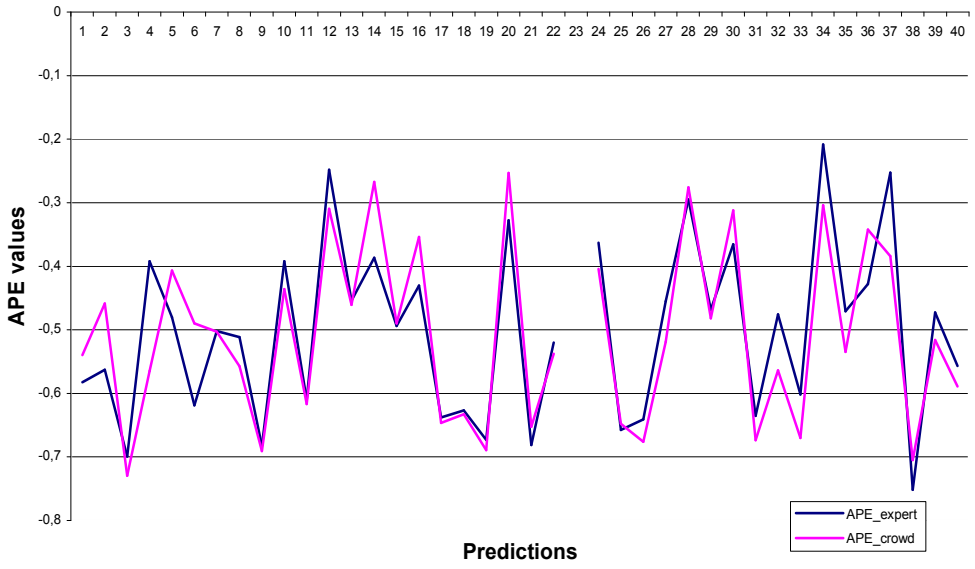

Figure 6: APE-values predictions experts and non-experts

For the Median Absolute Percentage Error (MdAPE), we have separated the questions with three possible answers from the questions with two possible answers, because it will not be reliable to take the median from predictions with a different number of answers. This is because the price and probability of an answer from a question with two possible answers starts off with a value of fifty dollars and fifty per cent, while the price and probability of an answer from a question with three possible answers begins with a value of thirty three dollars and thirty three per cent.

Statistics

		APE_Expert	APE_Non_expert
N	Valid	29	29
	Missing	0	0
Mean		-.447855	-.454100
Median		-.468100	-.482000
Mode		-.6411[a]	-.4901
Sum		-12.9878	-13.1689

a. Multiple modes exist. The smallest value is shown

Table 9: MdAPE with two answers

Statistics

		APE_Expert	APE_Non_expert
N	Valid	10	10
	Missing	0	0
Mean		-.663100	-.672210
Median		-.665550	-.672050
Mode		-.7515[a]	-.7295[a]
Sum		-6.6310	-6.7221

a. Multiple modes exist. The smallest value is shown

Table 10: MdAPE with three answers

Table 9 and 10 show the MdAPE's for both groups. The difference between the MdAPE for the experts and for the non-experts is 0.0139 in favour of the experts for the two-answered questions and 0.0065 for the questions with three answers (also in favour of the experts). However, we do not believe the difference of these values is significant.

Types of questions

We have verified whether the type of question is of influence when looking at significant difference between the experts and the non-expert. We have tested this by separating both groups with regard to the two types of questions ('Who wins?' versus 'With how many sets?'). After that, the Mann-Whitney test has been performed.

There is no significant difference between the final *stock values* of the two groups. Also no significant difference can be measured when comparing the number of *correct answers* of the experts to the non-experts after splitting the two types of questions that have been asked to the participants.

The difference measured when computing the significance level of the *average wealth* of both groups is also not significantly. This is true for both types of questions (see Appendix C.3).

Number of answers

Since the participants had questions with two as well as three possible answers, we wanted to test whether the number of answers makes a difference when looking at the results of both groups. The only questions with three answers were the questions about the number of sets in which the male tennis players would win. This could be three, four or five sets, while the women always play two or three sets.

When looking at the *stock value* of both groups for questions with two possible answers, the experts do not make significantly better predictions. The same goes for the stock value when the number of answers is three.

With regard to the number of *correct answers*, there is no significant difference between experts and non-experts. Whether we compute the significance level for the questions with two answers or with three answers does not make a difference. Also, there is no significant difference between the *average wealth* of the experts and the non-experts when performing the U-test based on only the questions with two answers. The same is true for the questions with three answers. All related figures can be found in Appendix C.4.

Information

We will now take a look at the types of information the non-experts have received during all seven competition rounds. There have been three categories of information: (i) limited information provided by the researchers, (ii) no information and allowed to search for information and (iii) no information and not allowed to search for information. We will now analyze whether this has any influence on the results of the non-experts, comparing them to the results of the experts.

Again, there is no significant difference between the three categories and two groups when looking at the *stock prices* of the correct answers. When looking at the *correct answers*, there is also no significant difference between the two groups. What attracts our attention is the fact that the non-experts have the largest advantage when limited additional information is provided; the mean rank of both groups then is almost similar. Furthermore, the experts again perform slightly better.

With regard to *average wealth*, there also is no significant difference between the two groups. What is striking is that the non-experts actually outperform the experts when looking at the average wealth when they may not search for information. Again, this difference is not significantly. All figures can be found in Appendix C.5.

Scale of participants

As researched by Christianson, the results obtained from the prediction markets are more reliable when the amount of participants increases. However, prediction markets also have shown to work in a very small number of participants. Christiansen has made categories of what amount of participants obtain similar results [14]: (i) more than 15 traders, (ii) 11 to 15 traders and (iii) less than 11 traders.

When only looking at the results when the prediction markets of both the experts and the non-experts fall into the same category, the following statements can be made. For the stock value, the right answer as well as the average wealth, the difference between the two groups is slightly in the advantage of the expert. However, the difference is not significantly. All figures can be found in Appendix C.6 and Appendix C.7.

5.3 Survey Wimbledon 2009

The main reason for this survey has been to measure how the participants had experienced the prediction market, how they used information sources and why they had (not) participated. We have chosen to ask these questions in Dutch, since all of our participants were Dutch and we wanted to minimize the threshold to participate. See Appendices A.4 and A.5 for the questions asked to the experts and the non-experts and Appendix A.4 and A.5 for the table of results and the results in graphical form.

We have examined the data as obtained from the surveys to be able to define the characteristics of the respondents and to be able to see what the differences are between the procedure of participation between the experts and the non-experts. During this research, we have considered the fact that we have asked these questions to the participants, which might not be the most reliable information. This since people tend to not behave as they claim to behave. However, we will now discuss the most striking findings.

Participants

We will firstly discuss the overall characteristics of the participants and have divided them into experts and non-experts.

First of all, the non-experts were far more difficult to trigger to participate in the prediction market, four out of the more than two hundred non-experts responded, while fifteen out of twenty three experts have participated one or more rounds. In fact, we were forced to add another group of people to our mailing list as the non-experts: our colleagues. The lack of enthusiasm to participate might be because they may not see the added value of participating, since they do not know anything about the Wimbledon competitions. Another reason could be that experts enjoy participating more than non-experts. In general, people enjoy taking part in a conversation about a subject they are familiar with and have a lot of knowledge about.

In total, twelve experts have filled in the survey and twenty three non-experts. The number of men and women are approximately equal among the two groups. However, the difference in age is quite large: the majority of the experts are between forty and fifty five years old, while the majority of the non-experts are between twenty five and forty years old. This is explained by the fact that the group of non-experts consists of students from the Erasmus University and colleagues which are quite younger than the tennis experts recruited at the tennis clubs. The same goes for the education of both groups: the non-experts are significantly better educated than the experts.

Obviously, the hours of tennis played per week and the number of years tennis is played and watched by the two groups is quite different. The majority of the experts are engaged in tennis for three to five hours per week, watch tennis competitions for six to ten years and play tennis three to six years. While the non-experts do not watch, play or engage in tennis what so ever.

Almost 92 per cent of the experts who filled in the survey actually participated in the prediction market, while almost 48 percent of the non-expert had participated. The non-participating non-experts were mostly students from the Erasmus University. One of the experts stopped participating because the application was too difficult. The other expert had stopped because of limited time; the participation cost her too much time. Reasons for the non-experts to not participate were mostly (i) limited time, (ii) they were not interested in participating or (iii) the goal of their participation was not clear. This might be an indication of the topic we have discussed earlier. The non-experts are more difficult to trigger to participate because they do not understand why their answer is of value or do not like to participate in something they do not know anything about.

More than forty per cent of the experts participated every round, twenty seven per cent of the non-experts participated every round. The main reason for both groups not to participate every round is that the rounds were too close to each other. The fact that this is more of a problem for the non-experts than the experts seems plausible; the tennis experts follow the competition and know when the players for the next round are known. The latter is relevant since there is not much time between the publication of the questions and the closing of the prediction market.

For both groups, the main goal is to participate in an experiment. This seems plausible, since the researchers have acquired the participants for that same reason. The prices that are raffled among the three participants with the overall highest score are not of great influence. What is striking is that merely thirty six per cent of the non-experts participate to obtain the highest score. For the experts this is less than ten per cent. It seems that the competition aspect is of much more influence to the non-experts than to the experts who are more interested in making accurate predictions.

Prediction market

In general, the experts claim not to be influenced by the price a stock has; they simply buy from the answer they think is right. However, the non-experts had a different approach; three out of eleven say that they bought from the other stock, when they found the price of the other stock too high. This could be a possible weakness of a prediction market, especially for the non-experts. People then might ignore their beliefs about who wins and bet on the answer that will provide for more money when it turns out to be true.

When buying stocks from a certain answer, a predefined number of shares were offered to buy: fifty, twenty, five shares and an option to fill in their own amount of shares (see Appendix C.1). We asked the participants if they had used this last option and we learned that the majority of the participants for both groups had actually used that option. However, more then thirty six percent of the experts did not even know about the option to buy your own amount of shares.

Most participants of the expert as well as the non-expert group claimed not to follow a strategy or had a strategy of buying the shares from the answer that was most likely to happen. Some of the experts and non-experts bought the shares as soon as possible, so that the price of the most popular answer was still low.

More than eighty per cent of both groups had experienced the participation as ‘fun’, ‘nice’ and ‘interesting’. What is striking is that some people commented about the (non-)user friendliness of the application itself. Especially the experts thought that there was too much email send by the application. Since the prediction market for the experts was private, we had to invite all participants by an automatically generated email. Furthermore, for every posted question (six per round) a non-optional automatic generated email was sent to the experts. We can imagine this is a bit too much email.

Sources decision making

We will now discuss the sources that the participants claim to have used during the experiments.

Most experts use their knowledge from previous competitions. Only half of the non-experts claim to have used their knowledge from previous competitions. Also the knowledge that can be derived from the performances of the players during the Wimbledon competition is a source that is mostly used by the experts.

Nearly fifty per cent of the non-experts gain their knowledge from relying on other sources, such as what is said on the internet or in newspapers. Experts tend to use this source of information much less. In both groups, nearly fifty per cent uses its intuition when making the predictions.

Information non-experts

Since we have subscribed to the non-experts when to use and when not to use information, we will now see whether and how they have used this information.

The majority of the non-experts used the additional information provided with the email 'most of the times' or 'always'. Approximately one-third claim to not have been influenced by this information, one-third says they were only influenced when they had no idea from which answer to buy their stocks and one-third bought shares from who had the most chance according to the statistics.

Most of the non-experts searched for information themselves 'most of the times'. The influence of this information on the final prediction is equally divided as the influence of the additional information.

6. EC2008 and AEX-index

This chapter reports on the research approach and results that apply to the analysis of the obtained data. With this analysis, we aim to get a better insight on the predicting performances of experts and non-experts in a non-prediction market environment.

We have analyzed two types of data:

1. **EC2008.** This data contains predictions from 50 participants about the out comings of the European Championship of 2008 of the soccer competitions. Before the competitions started, the participants were asked to make predictions about which team wins. We have categorized these predictions in 'expert predictions' and 'non-expert predictions' and we have analyzed the data.
2. **AEX-index.** During an eight years period, predictions have been made separately by experts and non-experts about the direction of the AEX-index concerning a one month and six months period. This data has also been analysed.

We will now take a look at the results of the analysis of the data from the AEX-index of www.iex.nl and the European Championship pool for soccer that was held in 2008. This data has been analyzed in order to determine whether there is a significant difference between the overall predictions of the experts and the overall predictions of the non-experts.

6.1 Results EC2008

If it was possible to contact the participants, we have asked them six questions (see figure 5) to be able to determine who is the soccer experts and who is not.

General information

For the EC2008 data, we used the same definition for experts as for the Wimbledon experiment: the person should have more than three years experience in playing and watching soccer matches and should engage in soccer more than one our per week in order to be an expert. Fifty participants responded and were categorized as experts and non-experts.

The experiment took place in June 2008 in the Netherlands. In total, fifty two predictions were measured by fifty participants. Twenty of them were experts and thirty were non-experts. The experts had an average of sixteen years of experiences in watching the important competitions and fourteen years of experience in playing soccer themselves.

All participants paid € 5 to be able to join the pool, the first, second and third best predictor has won respectively € 246, € 123 and € 41.

Predictions and results

We have made an overall analysis of the percentages of both groups that have made the right predictions. When performing the Mann-Whitney Test and the chi-square test on the percentages of correct answers and the number of correct answers, we conclude that there is no significant difference of the performance of the two (see Appendix D.2).

Winner

When just looking at the questions '*Who wins the competition?*', the majority of the non-experts has predicted the wrong team to win, while the majority of the experts has predicted the right team to win. However, in terms of percentages as well as number of correct answers this difference is not significantly.

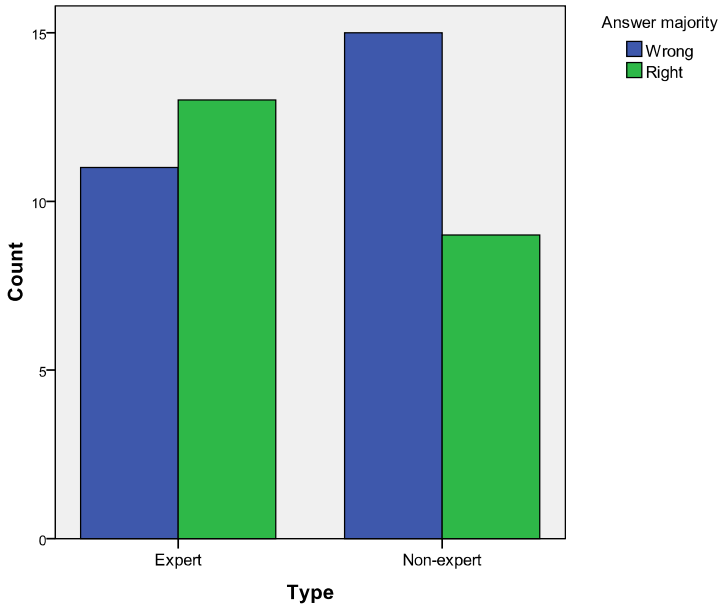

Figure 7: Right and wrong answers 'Who wins?'

Score

Only once, the majority of the experts had predicted the right number of goals for each team in a competition right. The non-experts have actually never accomplished this. There is not a significant difference between the amount of correct answers between the two groups. Also in terms of percentages, one group does not significantly outperform another group.

Median Absolute Percentage Error

We will now take a look at the MdAPE-values of both groups. The closer to zero this value is the better. Figure 8 shows that there are quite some similarities between the APE-values of both groups.

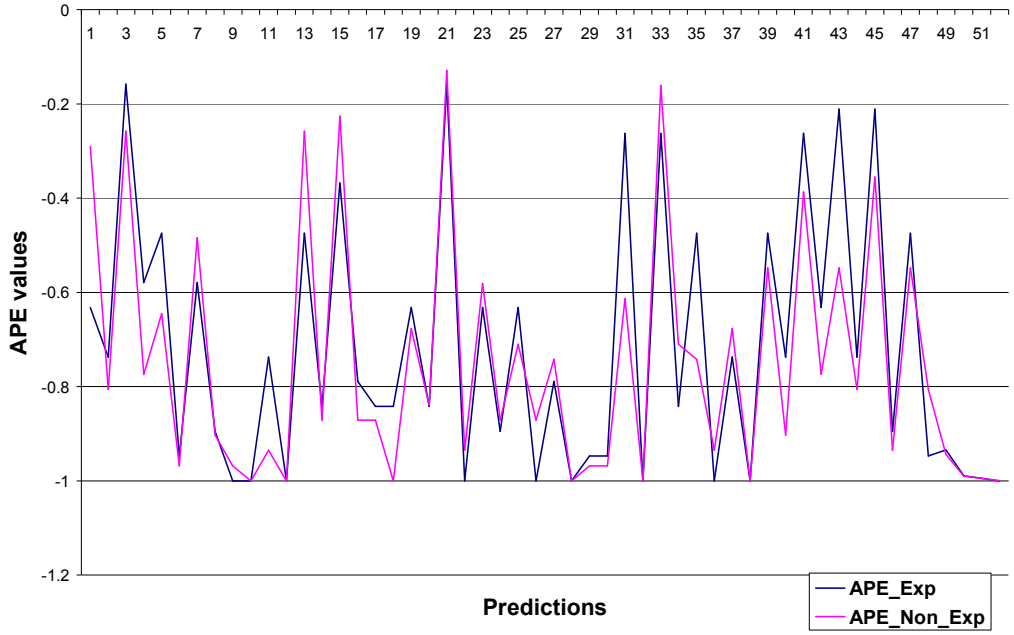

Figure 8: APE-values predictions experts and non-experts EC2008

When calculating the MdAPE values, we have separated the question '*Who is the winner?*' from the question of '*What is the number of goals each team makes?*'. This has been done because the first question has a fifty-fifty chance to give the right answer, while the latter has several options.

When calculating the MdAPE values of the experts and non-experts in terms of 'Which team wins?', we are able to see quite a difference (see table 11). The group of experts has a percentage error that is 0.0905 lower than the non-experts; the lower this value is, the better. It has been the first large difference in terms of comparing the accuracy of a predicted event. However, we can not measure the significance of this difference, since these are just two values compared with each other. We need a range of values to be able prove whether there is a significant difference between them.

Statistics

		APE_Expert	APE_Non_Expert
N	Valid	24	24
	Missing	0	0
Mean		-.5176667	-.5550417
Median		-.4740000	-.5645000
Mode		-.47400	-.54800
Std. Deviation		.24859250	.25420575

Table 11: MdAPE 'Which team wins?' EC2008

The MdAPE-value of the question 'What is the number of goals each team makes?' shows a slight difference in favour of the experts. However, this is not a major difference compared with the MdAPE-value of the non-experts.

Statistics

		APE_Expert	APE_Non_Expert
N	Valid	24	24
	Missing	0	0
Mean		-.8793750	-.8977500
Median		-.8950000	-.9030000
Mode		-1.00000	-1.00000
Std. Deviation		.12455863	.08704434

Table 12: MdAPE 'What will be the score?' EC2008

6.2 Results AEX-index

The data of the AEX-index contains data of predictions about the AEX-index that are made by experts and non-experts on a monthly basis for an – almost – eight year's period.

General information

We will analyse the answers of the experts and the non-experts with regard to two questions, namely:

- How do you think the stock market (AEX) will develop the following month?
- How do you think the stock market (AEX) will develop the following six months?

Experts were defined as: 'People that make a living or have made a living in the stock market' and non-experts are all internet users that visited www.iex.nl during the period the survey can be filled in. There is a chance that the internet users filling in the questionnaire are actually experts, but we believe that in general they are not experts. We have used the data from December 2001 through June 2009. The 'experiments' have been and are still being held in the Netherlands. No information is provided to the participants; however they may all search any information whatsoever.

The total number of predictions of the one-month predictions are 92 predictions and for the six months predictions 86 predictions per person in eight years. The amount of participants varies between 265 and 2553 for the one-month predictions and between 272 and 2544 for the six-month predictions. On average the amount of experts are 40 and the number of non-experts are 770. None of the participants are provided with financial incentives.

Predictions and results

One-month predictions

First of all, we made a graphical overview of the Absolute Percentage Error of both groups. The more close to zero the value is the better. We are able to see in this figure that experts have more outliers than non-experts; sometimes they make rather accurate predictions while other times they make very inaccurate predictions. Non-experts are steadier in their predictions; in general they stay between the boundaries of 0.5 and 0.8.

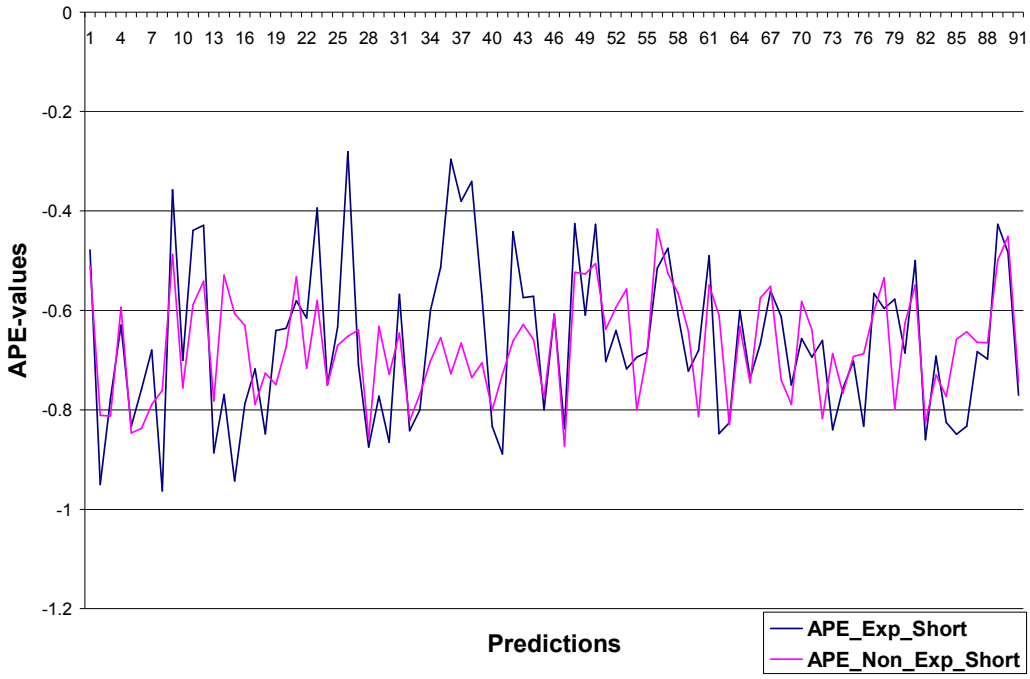

Figure 9: APE-values one month predictions experts and non experts AEX-index

Based on the Absolute Percentage Error values, we have calculated the MdAPE values for the short term predictions of the experts as well as the non-experts.

Statistics

		APE_Exp_Short	APE_Non_Exp_Short
N	Valid	91	91
	Missing	8	8
Mean		-.6632681	-.6726505
Median		-.6833000	-.6652000
Mode		-.83330	-.63260
Std. Deviation		.15833874	.10558614

Table 13: MdAPE one month predictions AEX-index

The Median Absolute Percentage Error of the non-experts is 0.0181 lower than the one from the experts, which means the non-experts have made slightly better predictions.

In addition, we have performed the Mann-Whitney test for the percentage of right answers and the chi-square test of association for comparing the percentages that had predicted the right answer and the overall correct answers both groups have given. Regarding the percentages of predicted correct answers as well as the overall predicted right answers, there is no significant difference between both groups (see Appendix D.1). However, the experts make slightly better predictions than the non-experts.

Six-month predictions

Table 10 shows a graphical overview of the APE-values of both parties for the six-month predictions. Again, the experts have more outliers than the non-experts, which predictions are more steadily accurate.

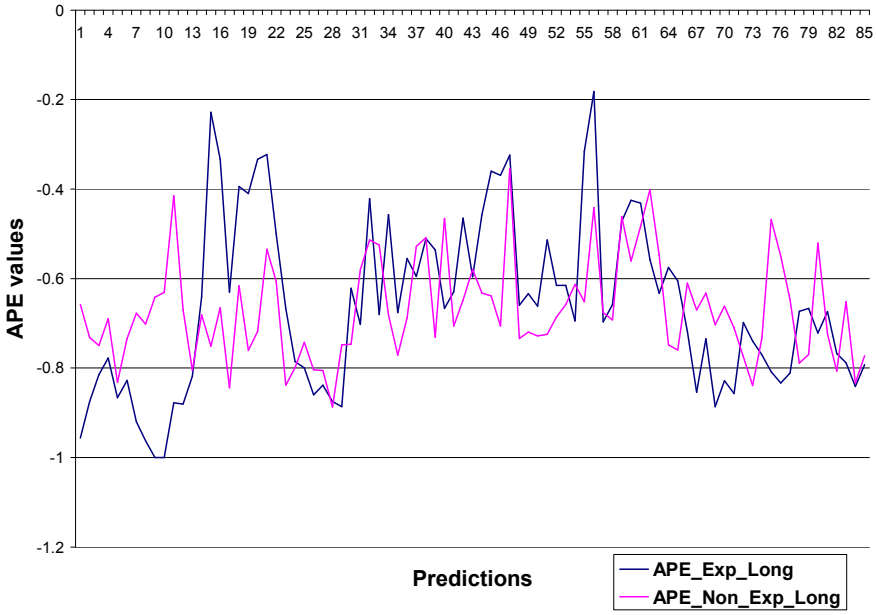

Figure 10: APE-values six month predictions experts and non-experts AEX-index

The Median Absolute Percentage Error for the experts as well as the non-experts is shown in the table below. Regarding the six-months predictions, the experts are slightly (0.0132) but not strikingly more accurate then the non-experts.

Statistics

		APE_Exp_Long	APE_Non_Exp_Long
N	Valid	85	85
	Missing	14	14
Mean		-.6602329	-.6694529
Median		-.6731000	-.6863000
Mode		-.66670	-.73370[a]
Std. Deviation		.19029585	.11387364

Table 14: MDAPE six month predictions AEX-index

Again, based on the Mann-Whitney test and the chi-square test, there is no significant difference between the percentage and number of correct answers as predicted by the experts and the non-experts.

7. Conclusions

In this final chapter, we will draw our conclusions based on the different types of research we have performed. We will first start with an overview of the results, which will lead us to the conclusions and discussions. After that, we will discuss the management implications and possible future research based on our findings.

We have researched whether group expertise is relevant for the accuracy of a prediction market. To be able to answer this research question, we have researched the results of previous research regarding the predictions of experts and non-experts. To do so, we have researched five articles and two data sets: (i) the EC2008 pool and (ii) AEX-index predictions. Also, we have investigated whether there is a significant difference between the predictions of experts or non-experts in a prediction market. We have looked at different situations, such as the type of questions and the number of answers. To do so, we have set up two prediction market environments during the Wimbledon competitions of 2009. We have compared the results of the Wimbledon prediction markets to the results of the articles and the two data sets. To conclude, we have researched the characteristics of experts and non-experts and the differences in the way they make decisions through a survey. This was meant to give us more insight in the decision making process and the influence this may have on the accuracy of the predictions.

7.1 Overview

We will first give an overview of the results of our research. To do so, we have compared the results of all researched data and have performed a cross-case analysis.

7.1.1 Results regarding experts and non-experts

Although the definitions of expert, the number of predictions and participants, the dates of the experiments, the countries where the experiments have been done, the researched area and the offered incentives varied across our research, the results are generally similar. There is no significant difference between the performances of a group of experts comparing it with a group of non-experts. In only one of the five articles – namely the article on stock markets – the experts outperformed the non-experts significantly and not even in all cases. In the stock market article, merely half of the predictions of experts were significantly better, but there were also some cases in which non-experts (significantly) outperformed experts. However, in most cases the difference of the predicting performances was not significant. This corresponds with the results that we got from the obtained data. In general, no significant differences in the accuracy of predictions were identified for the results of the EC2008 data en the predictions regarding the AEX-index. Only the data of the soccer pool of 2008 showed quite a difference in the Median Absolute Percentage Error in favour of the experts. The other two variables did not show a significant difference and the data from the AEX-index did not show any significant difference at all.

When analyzing the articles, it seems that providing the non-experts with information does not have a measurable influence on the performances of the non-experts. In fact, the only article that shows significant difference in the accuracy in favour of the experts, does not even provide for information regarding the specific topic. The data from the experiments of Wimbledon shows similar results; no significant difference has been measured comparing the results of the questions where information has been provided to the questions where no information has been provided with the results of the experts. Comparing both results to the results of the experts, no significant difference can be measured. This is consistent with previous research [7], in which Oskamp reported that when information was supplied to participants, the confidence level increased. However, the accuracy was unchanged.

7.1.2 Characteristics of experts and non-experts

The non-experts were much less likely to participate. We sent out a similar email to both groups and the response rate of the experts was much higher than the response rate of the non-experts. The non-experts were not interested in participating or did not understand their added value in participating. Also, the percentage of participants that have actually joined the prediction market every round was higher with the experts. They are more involved in the subject and follow the competitions. Therefore, they know when new questions will be posted and are less likely to miss a round of questions. This might a reason to include experts instead of non-experts in a prediction market, although they might not make significantly better predictions.

Unfortunately, we can not say much about the average numbers of years of experience of the experts. In most of the experiments in the articles this is not mentioned and this is also the case in the obtained data from the AEX-index. Although we do know that the experts from the data from AEX-index must make or have made a living in the field, which implies they have been engaged in trading in the stock market for several years. We only know that the average years of experience of the experts in the European Championship pool of soccer is fifteen years and of the Wimbledon tournament six years (playing as well as watching). The non-experts are also defined differently in the several data sets.

Almost all participants have enjoyed participating in the prediction market during the Wimbledon experiment. Remarkably, some experts have complained about the application itself, mostly the lack of user friendliness and the frequent emails they receive from the application. This is a result of the default settings of the **private** prediction market which was implemented for the experts.

All other known differences in characteristics of the Wimbledon participants, such as age, education, knowledge in the subjects has been noted and explained in paragraph 5.3. No unexpected patterns have been discovered.

7.1.3 Differences of groups in decision making process

There are some differences in the decision making process of an expert comparing it with a non-expert. Firstly, we must note that we have questioned both groups through a survey. Unfortunately, people tend to not always do what they claim to do. However, we have carefully tried to derive the most interesting finding of this survey.

Besides the obvious differences, such as the expert rely more on results of players in previous competitions and the results of the players in the actual Wimbledon competitions, we also found some less obvious differences. For example, experts tend to look and depend on the price and probability less than the non-experts do. In general, experts simply buy shares from the answer they think is right. Previous research has shown that experts as well as non-experts are both limited in the usage of available information, which implies that the experts are just as limited in processing information as the non-experts[16][17][18].

Also, the non-experts claim to be more interested in the competition part of the prediction market and tended to strategically buy shares. For example, buying as soon as possible, while the share of the presumed answer is still low or buying shares from the answer with a low value. Then, more profits were obtained if the answer turned out to be right. This goes against the 'rules' of the prediction market, where the answer which is thought to be right should be chosen by the participants.

7.1.4 Which group makes better predictions?

As stated earlier, no significant difference can be measured between the predictions of a group of experts and a group of non-experts in general. In some cases, the experts make slightly better predictions, while in other cases the non-experts make more accurate predictions. In the experiment of Wimbledon, mostly the experts have made slightly better decisions.

This has been measured for the Wimbledon experiment comparing (i) the stock value of the correct answer of experts to the value of the non-experts, (ii) the (number of) correct answers of experts to the correct answers of the non-experts and (iii) the average wealth of experts to the average wealth of the non-experts.

These variables have been tested under the following condition:

- The overall results of the experts and the non-experts.
- The results when separating the two types of questions ('Who wins?' and 'In how many sets?').
- The results when separating the numbers of answers (Two answers and three answers).
- The results when separating the three different providences of information (limited information, no information and information as wished by the non-expert).
- The results when measuring only the predictions when the two groups fall into the same category of number of participants.

Also the Median Absolute Percentage Error (MdAPE) has been calculated under these conditions. None of these variables influenced the difference in accuracy of the predictions of both groups.

To conclude, the significant difference of the obtained data from the EC pool and the AEX-index has been measured under a smaller subset of conditions. No significant difference in level of accuracy of predictions has been measured.

7.1.5 Differences results prediction markets versus 'normal' predictions

There are no prominent differences between the results obtained from the articles and the obtained data and the experiment as performed. Both groups show no significant differences in the accuracy of the predictions. There is a slightly larger chance that experts make better predictions in a non-prediction market environment. However, this could also be a result of the fact that there is more data available on predictions in a non-prediction market environment.

7.2 Conclusions

We will now draw our conclusions based on the results as have been discussed in the previous paragraph.

7.2.1 Accuracy predictions

Although different definitions of experts as well as non-experts have been maintained, the accuracy of the predictions that are made by experts is not significantly better than the predictions of non-experts. We have tested this with several variables, but the results in general were similar. In terms of accuracy, experts do not significantly outperform non-experts.

It seems that the types of participants that are placed within a prediction market are – with regard to expertise – not important. When for example a company would implement a prediction market, it does not make a significant difference whether experts or non-experts make their predictions in terms of the accuracy of the prediction.

Providing the non-experts with information does also not make a difference in the accuracy of the prediction. General information regarding how to predict seems to be sufficient. This is true for a prediction market environment as well as a non-prediction market environment.

7.2.2 Participation

However, we found that it is much more difficult to trigger non-experts to participate in a prediction market then it is to trigger the experts. This is when the added value of the experts can be noticed: they are more likely to participate and are also more loyal when they have to participate several times in a row. It is therefore less time consuming to motivate experts to participate in a prediction market then it is to motivate non-experts.

To that respect, it might be valuable to let experts participate in a prediction market instead of non-experts. Possible reasons of why non-experts are less likely to participate in a prediction market could be:

1. In general, people believe that experts make better predictions than non-experts and the non-experts do not see the value in them predicting.
2. The non-experts are less interested in the subject, so it is more difficult to make and keep them enthusiastic.
3. In the case of Wimbledon: the next competition was known not more than forty eight hours in advance. The experts exactly knew when that was, since they follow the competitions; it is therefore more likely that the non-experts miss one or more rounds.

7.2.3 Differences in decision making process

In general, experts buy shares from the answers they believe to the right ones, while non-experts tend to buy their shares more strategically. Non-expert are more willing to buy 'as soon as possible', while the price of the presumed right answer is still low or buy shares from the answer with a low value so when it turns out to be the right answer, more profits are made. Especially the latter might not be of best interest to the prediction market mechanism. However, it is not exactly known whether this is the added value of the non-experts or can be considered as 'manipulation'.

7.2.4 Limitations

During our research, we faced some limitations which we had to cope with. First of all, we were unable to obtain the number of participants we had hoped in the Wimbledon experiment. Several tennis experts that had claimed to join the experiment, did not participate and the response rate from the non-experts was very low. This had its impact on the experiment as well as the survey. We limited the impact on the reliability of the data by arranging the number of participants in scales as researched by Christianson [14] since it has been proven that the same level of accuracy is obtained with certain amounts of participants. With regard to the survey, we did not make final conclusions only based on the data from the survey, but always founded it also on other data as well.

With the data from the AEX-index, there were much (sometimes ten times) more non-experts than experts. Unfortunately, we were not able to take samples, since we were provided with a data set that only contained the sum of the predictions that were made. We have not made conclusions only based on the data from the AEX-index. However, the same conclusions that could be drawn from the data from AEX-index have been drawn for the other data that has been researched.

Another limitation is the several definitions of experts and non-experts. Almost every source held another definition of the two groups. Again, the main results of the data all matched. So in the end, it did not matter what definition was used; the conclusions were the same.

7.3 Management Implications

Based on paragraph 7.2, we would like to translate our conclusions to the management implications on the enterprise prediction market to be able to see what the conclusions imply for companies that have implemented or would like to implement a prediction market.

Our main conclusion would be that in terms of accuracy of the prediction, it does not matter who to give access in terms of expertise to the related topic. However, there might be other reasons than accuracy, to prefer the participation of experts participate in a prediction market. One of those reasons is that experts are more willing to participate. We believe this results from what seems to be a logical assumption of people in general: the greater knowledge on a topic should be reflected in the accuracy of their judgments [8]. As a result, non-experts need more convincing and explaining to be able to motivate them to participate.

Secondly, experts are more likely to continue to participate when frequent response to questions is needed. This could have been a result of the lack of involvement of the non-experts. However, it could also be that non-experts do not follow the subject and therefore do not know when new questions are published, while the experts follow certain events and know when new questions will be posted. When the prediction market does not contain follow-up questions, this second reasoning is not an issue for the company.

Since research has shown that although prediction markets may work in smaller amounts of participants, better results may be obtained from a larger amount of participants [14], Our advise would be to include all employees, customers, suppliers or even randomly chosen participants when there is no sensitive information involved. However, non-experts tend to play more strategic games, like betting on the underdog to optimize profits when the answer turns out to be right. It is not known whether this contributes to or diminishes the accuracy of the prediction markets of non-experts. Wolfers and Zitzewitz [12] have addressed the need for uninformed traders as "prediction markets need uninformed order flow in order to function; with only rational traders trading whose only trading motivation is expected returns" but they also address that manipulation should be limited. However, it is not known where the 'need for uninformed order flow' ends and 'manipulation' begins. Manipulations are intended to gain personal benefits in real life [3], which is not the case in our experiment. This should mean that the strategic behaviour of the non-experts benefits the actual outcome of the prediction market.

We have listed the following advice to companies that have implemented or considering implementing a prediction markets into the company's environment:

- Invite as many participants as possible to the company's prediction market: there is no relevance with regard to the accuracy of the out coming of the prediction market.
- In general, employees that have more knowledge on the subject need less explanation why you want them to participate. Also, more knowledgeable employees are more likely to keep participating when related questions are asked consecutive. This means that non-experts might need an extra stimulation to participate.
- Be aware of the 'contradictory effect of the prediction market' that might occur when non-experts are involved. It seems that they have different approaches to come to their decisions. While experts merely buy the shares of the answer they believe is most likely to be right, some non-experts tend to play a more strategic game. However, it is yet to be researched whether this contributes to the accuracy of the prediction market or contributes to the 'manipulation' of the prediction market [12]. For now, it seems that this behaviour contributes to the accuracy of the outcome of the non-experts' prediction market, since manipulation is defined as the intention to gain personal benefits in real life [3], which is not the case in our experiment.

Based on this research, we would like to recommend all companies to consider implementing a prediction market to support their decision making process in case predictions are a necessary part of the decision making process. We have proven with this research that – based on several data – a group of experts is not capable of making significant better predictions than non-experts.

Especially companies that have hired expensive experts to make forecasts about future events – such as turnover and product innovation – can save a lot of money, by just asking employees, suppliers and customers to make these forecasts for them. Even on a larger scale than previously researched, experts do not outperform non-experts significantly when using a prediction market to forecast.

7.4 Future Research

A first suggestion for future research is that more research should be done to make sure why the experts are more easily triggered to participate. A following recommendation for future research – depending on the out coming of the question – would be to research how to trigger non-experts to participate and to keep participating in a prediction market? The reason for this is that there are much more non-experts available in each specific area than experts. When we know how to trigger the non-experts, we will have a lot more possible participants for prediction markets. This means that the predictions will become more and more accurate [14].

A third recommendation to further research is what the differences are in strategies of experts and non-experts. We have seen that the decision making process of both groups are different. However, we have not been able to conclude to what extent.

Also the impact of these different strategies on the prediction markets could be further investigated. However, we have been able to conclude through our research that if there actually is a difference between the strategies of experts and non-experts, it does not have an impact on the accuracy of the prediction itself. However, it might be interesting to research what will happen when the price of a share is separated from the probability that the event occurs. The price of a share will remain the same and participants will be less triggered by the price of a share and might be more likely to buy shares from the answer they believe is the right one. The price of the share remains the same, but the probability will change as a result of the shares that are bought by participants. We believe this is interesting future research for our colleagues.

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Appendix A: Survey questions

A.1: Questions EC2008 participants

1) Heeft u het formulier zelf ingevuld?
   a. Ja
   b. Nee
   c. Gedeeltelijk
   d. Ik weet het niet meer

2) Hoeveel uur spendeert u gemiddeld wekelijks aan voetbal (zowel spelen als kijken)?
   a. 0 uur
   b. 1 – 3 uur
   c. 3 – 5 uur
   d. 5 – 10 uur
   e. 10 – 15 uur
   f. Meer dan 15 uur

3) Hoe lang volgt u de belangrijke voetbalwedstrijden (Champions League, EK, UEFA cup)?
   a. Niet
   b. 0 – 3 jaar
   c. 3 – 6 jaar
   d. 6 – 10 jaar
   e. 10 – 15 jaar
   f. Meer dan 15 jaar

4) Hoeveel jaar speelt u voetbal?
   a. Niet
   b. 0 – 3 jaar
   c. 3 – 6 jaar
   d. 6 – 10 jaar
   e. 10 – 15 jaar
   f. Meer dan 15 jaar

5) Wat is uw leeftijd?
   a. 15 – 25 jaar
   b. 25 – 40 jaar
   c. 40 – 55 jaar
   d. 55 – 70 jaar
   e. Ouder dan 70 jaar

6) Wat is uw hoogst genoten opleiding?

a. LBO of soortgelijke opleiding
b. MBO of soortgelijke opleiding
c. HBO of soortgelijke opleiding
d. WO of soortgelijke opleiding
e. Anders, namelijk

A.2: Survey questions experts Wimbledon

Experts

Participatie

1. Hebt u meegedaan met de voorspellingen voor Wimbledon?
    a. Ja
    b. Nee

    (Indien 'Ja' ga naar vraag 3)
2. Waarom hebt u niet meegedaan aan de voorspellingen van Wimbledon (meerdere antwoorden mogelijk)?
    a. Geen interesse
    b. Tijdgebrek
    c. Het belang van participatie was mij niet duidelijk
    d. Ik begreep de werking van de 'prediction market' niet
    e. Ik vond de applicatie te ingewikkeld
    f. Anders, namelijk……..

    Ga verder met vraag 10
3. Welk emailadres hebt u gebruikt voor de prediction market?

    ……
4. Hebt u met elke ronde meegedaan? Zo nee, waarom niet (meerdere antwoorden mogelijk?
    a. Ja, ik heb met elke ronde meegedaan
    b. Nee, de rondes waren erg snel achter elkaar waardoor ik 1 of meer rondes heb gemist
    c. Nee, soms wist ik de antwoorden niet en heb ik een ronde overgeslagen
    d. Nee, ik heb wat problemen gehad met de applicatie waardoor ik 1 of meer rondes niet heb meegedaan
    e. Nee, anders namelijk……

Motivatie

5. Wat was gaandeweg de belangrijkste drijfveer voor het blijven maken van de voorspellingen?
    a. Zoveel mogelijk antwoorden juist hebben
    b. Een zo hoog mogelijke score behalen
    c. Participeren aan een onderzoek
    d. Anders, namelijk…….

Beïnvloeden PM

6. Liet u zich beïnvloeden door het percentage en de prijs dat een bepaald antwoord van een gestelde vraag had?
    a. Ja, ik koos meestal het antwoord met het hoogste percentage, dus het meest gekozen antwoord
    b. Ja, maar ik zette meestal in op het minst gekozen antwoord, zodat ik meer won indien het antwoord juist was
    c. Ja, wanneer een antwoord een te hoge prijs had, kocht ik het aandeel minder of niet
    d. Soms, wanneer ik het antwoord zelf niet wist zette ik in op het meest gekozen antwoord
    e. Nee, ik keek er wel naar maar liet mij niet beïnvloeden
    f. Nee, daar keek ik nooit naar
    g. Anders, namelijk……
7. Hebt u weleens handmatig aandelen gekocht door middel van de optie 'Advanced' waar u zelf kunt aangeven hoeveel aandelen u wilt kopen van het gekozen antwoord?
    a. Nee, ik wist niet dat die optie bestond
    b. Nee, dat was niet nodig, want het juiste aantal aandelen stond er altijd al tussen
    c. Ja, maar alleen om mijn geld op te kunnen maken
    d. Ja, voornamelijk om aan te geven hoe overtuigd ik was dat het betreffende antwoord het juiste was
    e. Anders, namelijk……

Informatiebronnen

8. Welke informatiebronnen heeft u gebruikt bij het beantwoorden van de vragen (meerdere antwoorden mogelijk)?
    a. Opgedane kennis door het volgen van eerdere toernooien
    b. Het volgen van de Wimbledon wedstrijden
    c. Het raadplegen van informatiebronnen zoals internet, kranten etc.
    d. Intuïtie
    e. Anders, namelijk……

9. Hebt u nog een bepaalde strategie gevolgd? Zo ja, welke (meerdere antwoorden mogelijk)?
    a. Nee, ik volgde geen specifieke strategie
    b. Ja, ik zette het meeste/ alleen geld in op de vragen waarvan ik het meest zeker was dat het antwoord het juiste was
    c. Ja, ik bekeek eerst de percentages bij de antwoorden en zette in op het antwoord met het hoogste percentage ervan uitgaand dat eerdere deelnemers het juiste antwoord weten
    d. Ja, ik bekeek eerst de percentages bij de antwoorden en zette in op het antwoord met het laagste percentage, waardoor ik – indien het antwoord juist was – meer geld kon winnen
    e. Ja, ik probeerde zo snel mogelijk na publicatie te voorspellen zodat de prijs van het juiste antwoord nog laag is en ik maximale winst behaald kon behalen
    f. Ja, anders namelijk……
10. Hoe vond u het om te participeren in de prediction market?

    ……..

Algemeen

11. Wat is uw geslacht?
    a. Man
    b. Vrouw
12. Wat is uw leeftijd?
    a. 15 – 25 jaar
    b. 25 – 40 jaar
    c. 40 – 55 jaar
    d. 55 – 70 jaar
    e. Ouder dan 70 jaar
13. Wat is uw hoogst genoten opleiding?
    a. LBO of soortgelijke opleiding
    b. MBO of soortgelijke opleiding
    c. HBO of soortgelijke opleiding
    d. WO of soortgelijke opleiding
14. Hoeveel uur spendeert u gemiddeld wekelijks aan tennis (zowel spelen als kijken)?
    a. 0 – 2 uur
    b. 2 – 5 uur
    c. 5 – 10 uur
    d. 10 – 15 uur
    e. Meer dan 15 uur

15. Hoe lang volgt u de Grand Slam toernooien?
    a. 0 – 3 jaar
    b. 3 – 6 jaar
    c. 6 – 10 jaar
    d. 10 – 15 jaar
    e. Meer dan 15 jaar
16. Hoeveel jaar speelt u tennis?
    a. 0 – 3 jaar
    c. aar
    c. 6 – 10 jaar
    d. 10 – 15 jaar
    e. Meer dan 15 jaar

Dit is het eind van de vragenlijst. Hartelijk dank voor het invullen!

A.3: Survey questions non-experts Wimbledon

Participatie

1. Hebt u meegedaan met de voorspellingen voor Wimbledon?
    a. Ja
    b. Nee

    (Indien 'Ja' ga naar vraag 3)
2. Waarom hebt u niet meegedaan aan de voorspellingen voor Wimbledon (meerdere antwoorden mogelijk)?
    a. Geen interesse
    b. Tijdgebrek
    c. Het belang van participatie was mij niet duidelijk
    d. De werking van de 'prediction market' was mij niet duidelijk
    e. Het lukte mij niet om te registreren
    f. Anders, namelijk……..
3. Welk emailadres hebt u gebruikt voor de prediction market?

    ……
4. Hebt u met elke ronde meegedaan? Zo nee, waarom niet (meerdere antwoorden mogelijk?
    a. Ja, ik heb met elke ronde meegedaan
    b. Nee, de rondes waren erg snel achter elkaar waardoor ik 1 of meer rondes heb gemist
    c. Nee, soms wist ik de antwoorden niet en heb ik een ronde overgeslagen
    d. Nee, ik heb wat problemen gehad met de applicatie waardoor ik 1 of meer rondes niet heb meegedaan
    e. Nee, anders namelijk……

5. **Motivatie**

   Wat was uw insteek bij het maken van de voorspelling (meerdere antwoorden mogelijk)

   a. Zoveel mogelijk antwoorden juist hebben
   b. Een zo hoog mogelijk bedrag winnen
   c. Participeren aan een onderzoek
   d. Anders, namelijk…….

Beïnvloeden PM

6. Liet u zich beïnvloeden door het percentage en de prijs dat een bepaald antwoord van een gestelde vraag had?

   a. Ja, ik koos meestal het antwoord met het hoogste percentage, dus het meest gekozen antwoord
   b. Ja, maar ik zette meestal in op het minst gekozen antwoord, zodat ik meer won indien het antwoord juist was
   c. Ja, wanneer een antwoord een te hoge prijs had, kocht ik het aandeel minder of niet
   d. Soms, wanneer ik het antwoord zelf niet wist zette ik in op het meest gekozen antwoord
      Nee, ik keek er wel naar maar liet mij niet beïnvloeden
   e. Nee, daar keek ik nooit naar
   f. Anders, namelijk……
   g. Hebt u weleens handmatig aandelen gekocht door middel van de optie 'Advanced' waar u zelf kunt aangeven hoeveel aandelen u wilt kopen van het gekozen antwoord?
      Nee, ik wist niet dat de optie bestond
   h. Nee, dat was niet nodig
   i. Ja, alleen om mijn geld op te maken
   j. Ja, om goed aan te kunnen geven hoe overtuigd ik was dat het betreffende antwoord de juiste was
   k. Anders, namelijk……

Informatiebronnen

7. Welke informatiebronnen heeft u gebruikt bij het beantwoorden van de vragen (meerdere antwoorden mogelijk)?

   a. Eerder opgedane kennis door het volgen van de toernooien
   b. Het volgen van de Wimbledon wedstrijden om te zien of de spelers in vorm zijn
   c. Het raadplegen van informatiebronnen zoals internet, kranten etc.
   d. Intuïtie
   e. Anders, namelijk……

8. Hebt u gebruik gemaakt van de toegevoegde informatie die steeds voor één van de wedstrijden gegeven werd?
    a. Altijd
    b. Meestal
    c. Soms
    d. Nooit
9. In hoeverre beïnvloedde de informatie uw uiteindelijke beslissing?
    a. Ik zette in op degene die volgens de statistieken de meeste kans had om te winnen
    b. Alleen wanneer ik zelf geen idee had, beïnvloedde de extra informatie mijn uiteindelijke antwoord
    c. De informatie beïnvloedde mijn uiteindelijke antwoord niet
    d. Anders, namelijk…….
10. In hoeverre hebt u gebruik gemaakt van de mogelijkheid om zelf informatie te zoeken over de spelers, wat steeds bij 1 van de wedstrijden mocht?
    a. Altijd
    b. Meestal
    c. Soms
    d. Nooit
11. In hoeverre beïnvloedde deze informatie uw uiteindelijke beslissing?
    a. Ik zette in op degene die volgens de informatiebronnen de meeste kans had om te winnen
    b. Alleen wanneer ik zelf geen idee had, beïnvloedde de extra informatie mijn uiteindelijke antwoord
    c. De informatie beïnvloedde mijn uiteindelijke antwoord niet
    d. Anders, namelijk…….
12. Hebt u nog een bepaalde strategie gevolgd? Zo ja, welke (meerdere antwoorden mogelijk?
    a. Nee, ik volgde geen specifieke strategie
    b. Ja, ik zette het meeste/ alleen geld in op de vragen waarvan ik het meest zeker was dat het antwoord het juiste was
    c. Ja, ik bekeek eerst de percentages bij de antwoorden en zette in op het antwoord met het hoogste percentage ervan uitgaand dat eerdere deelnemers het juiste antwoord weten
    d. Ja, ik bekeek eerst de percentages bij de antwoorden en zette in op het antwoord met het laagste percentage, waardoor ik – indien het antwoord juist was – meer geld kon winnen
    e. Ja, ik probeerde zo snel mogelijk na publicatie te voorspellen zodat de prijs van het juiste antwoord nog laag is en ik maximale winst behaald kon behalen
    f. Ja, anders namelijk……
13. Hoe vond u het om te participeren in de prediction market?

    ……..

Algemeen

14. Wat is uw geslacht?
    a. Man
    b. Vrouw
15. Wat is uw leeftijd?
    a. 15 – 25 jaar
    b. 25 – 40 jaar
    c. 40 – 55 jaar
    d. 55 – 70 jaar
    e. > 70 jaar
16. Wat is uw hoogst genoten opleiding?
    a. LBO of soortgelijke opleiding
    b. MBO of soortgelijke opleiding
    c. HBO of soortgelijke opleiding
    d. WO of soortgelijke opleiding
17. Hoeveel uur spendeert u wekelijks aan tennis (zowel spelen als kijken)?
    a. 0 uur
    b. 1 – 3 uur
    c. 3 – 5 uur
    d. 5 – 10 uur
    e. 10 – 15 uur
    f. Meer dan 15 uur
18. Hoe lang volgt u de Grand Slam toernooien?
    a. Niet
    b. 0 – 3 jaar
    c. 3 – 6 jaar
    d. 6 – 10 jaar
    e. 10 – 15 jaar
    f. Meer dan 15 jaar
19. Hoeveel jaar speelt u tennis?
    a. Niet
    b. 0 – 3 jaar
    c. 3 – 6 jaar
    d. 6 – 10 jaar
    e. 10 – 15 jaar
    f. Meer dan 15 jaar

Dit is het eind van de vragenlijst. Bedankt voor het invullen!

A.4 Table of Results Survey Wimbledon Case

Nr.	Type	Part	Why_not_part	Part every round?	Why_not_part_every_round	Goal_participation	Influence_price_stock
1	1	1		1		2	0
2	1	1		1		1	0
3	1	1	2	0	1	4	1
4	1	1		0	1	1	1
5	1	1		0	1	1	1
6	1	1		1		1	0
7	1	1		1		1	0
8	1	0	1	0			
9	1	1		0	1	1	0
10	1	1		1		3	3
11	1	1		0	1	1	1
12	1	1		0	2	2	1
13	2	1		0	1	3	3
14	2	1		1		3	1
15	2	0	1				
16	2	1		0	1	1	1
17	2	1		0	1	3	1
18	2	1		0	1	1	0
19	2	1		0	1	3	1
20	2	0					
21	2	1		0	1	1	3
22	2	0	1				
23	2	0	2				
24	2	1		0	1	1	4
25	2	1		1		1	3
26	2	1		0	1	2	2
27	2	1		1		1	0
28	2	0	1				
29	2	0	1				
30	2	0	4				
31	2	0	3				
32	2	0	3				
33	2	0	1				
34	2	0	3				
35	2	0	3				

Nr	Bought_own_ amount_stock	Source_previous_ competititions	Source_following_ Wimbledon	Source_consulting_ other_sources	Source_intuition
1	0	1	1	0	1
2	3	1	1	0	1
3	3	1	0	0	1
4	0	1	1	0	0
5	0	1	1	0	0
6	0	1	1	0	1
7	2		0	1	0
8					
9	3	0	1	0	0
10	3	1	1	1	0
11	3	1	0	0	1
12	1	1	1	0	0
13	2	0	1	0	0
14	1	0	0	0	1
15					
16	2	1	1	1	1
17	3	1	1	0	0
18	0	1	0	0	1
19	3	1	0	0	0
20					
21	3		0	1	0
22					
23					
24	2	0	0	0	1
25	3	0	0	1	1
26	2	0	1	1	0
27	3	1	0	1	1
28					
29					
30					
31					
32					
33					
34					
35					

Nr	Used_information_provided	How_influenced_prov_info	Searched_information	How_influenced_searched_info
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13	2	1	1	1
14	1	0	1	0
15				
16	2	1	1	1
17	3	1	1	1
18	0	0	2	2
19	0	0	1	0
20				
21	3	2	3	2
22				
23				
24	0	0	0	0
25	2	1	2	1
26	3	2	3	2
27	3	2	1	2
28				
29				
30				
31				
32				
33				
34				
35				

Nr	Strategy	Opinion_pred_market	Opinion_appl.	Sex	Age	Education	Hours_tennis	Watch_tennis	Play_tennis
1	0	1	1	1	1	1	4	4	4
2	1	1	0	1	3	2	2	5	3
3	0	0	1	2	3	1	2	4	4
4	1	1	1	2	3	2	2	4	3
5	1	1	1	2	3	2	2	4	3
6	0	1	0	2	4	2	3	5	4
7	1	1	0	1	3	3	2	5	5
8			0	2	3	2	2	2	3
9	0	1	0	1	4	1	4	4	5
10	2	1	0	1	2	3	2	5	3
11	1	0	0	2	2	3	3	4	5
12	0	1	0	1	3	3	3	3	4
13	2	1	0	1	1	1	1	1	1
14	1	1	0	2	2	2	0	0	0
15				2	1	2	0	0	0
16	0	1	0	2	2	2	1	2	0
17	1	1	0	2	2	2	1	1	0
18	0	1	0	1	2	2	1	2	0
19	1	1	0	1	2	2	1	4	0
20				2	2	2	0	0	0
21	1	1	0	2	3	3	0	0	1
22				2	2	1	1	0	1
23				1	2	2	2	3	1
24	0	0	0	1	2	2	0	0	0
25	2	1	0	1	2	3	0	0	0
26	0	1	0	2	2	1	1	1	1
27	1	0	0	1	2	3	0	0	0
28				2	2	3	0	0	5
29				1	1	3	0	0	0
30				1	2	3	2	2	0
31				1	1	3	0	0	0
32				1	2	3	1	3	0
33				2	1	3	0	0	0
34				2	1	3	0	2	0
35				1	1	3	0	0	0

Legend Results Survey Wimbledon Case

Type
1. expert
2. non-expert

Part
0. Not participated
1. Participated

Why_not_part
1. Limited time
2. Too complicated
3. Not interested
4. Goal participation not clear

Part every round?
0. No 1. Yes

Bought_own_amount_stock
0. No, did not know the option existed
1. No, it was not necessary
2. Yes, to be able to spent all my money
3. Mostly how convinced I was it was the correct answer

Source_previous_competititions
0. No Source
1. Source

Strategy
0. No strategy
1. Bought only/ most stocks from the answer I was most sure of
2. Buy as soon as possible, so the price is still low and profits high

Opinion_prediction_market
0. Not nice
1. Nice
2. Not answered

Opinion_application
0. No opinion
1. Not user friendly

Gender
1. Male
2. Female

Age
1. 15-25 years 3. 40-55 years
2. 25-40 years 4. 55-70 years

Used_information_provided
0. Never
1. Sometimes
2. Most of the times
3. Always

Why_not_part_every_round
1. Rounds too close to each other
2. Other

Goal_participation
1. Research
2. Right answers
3. Highest score

Influence_price_stock
0. No, did not watch it
1. No, watched it but did not influence me
2. Sometimes when I did not know the answer
3. Yes, when price too high I did not or buy less
4. Yes, I mostly bought the stock with the highest price

Source_following_Wimbledon
0. No Source
1. Source

Source_intuition
0. No Source
1. Source

Source_consulting_other_sources
0. No Source
1. Source

Education
1. MBO
2. HBO
3. WO

Hours_tennis
0. 0 hrs p/w 3. 5-10 hrs p/w
1. 1-3 hrs p/w 4. 10-15 hrs p/w
2. 3-5 hrs p/w

Watch_tennis
0. Not 3. 6-10 yrs
1. 1-3 yrs 4. 10-15 yrs
2. 3-6 years 5. > 15 yrs

Play_tennis
0. Not 3. 6-10 yrs
2. 1-3 yrs 4. 10-15 yrs
2. 3-6 yrs 5. > 15 yrs

Searched_information
0. Never
1. Sometimes
2. Most of the times
3. Always

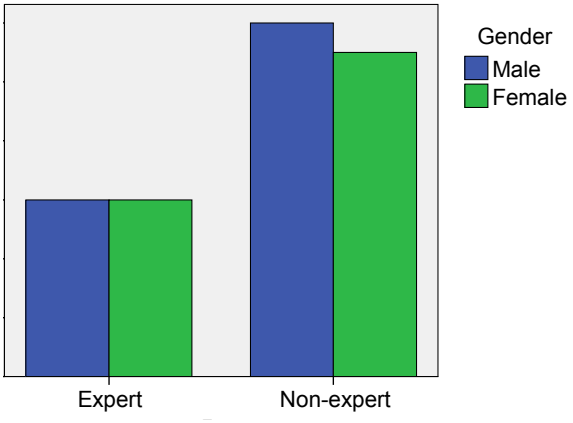
How_influenced_prov_info

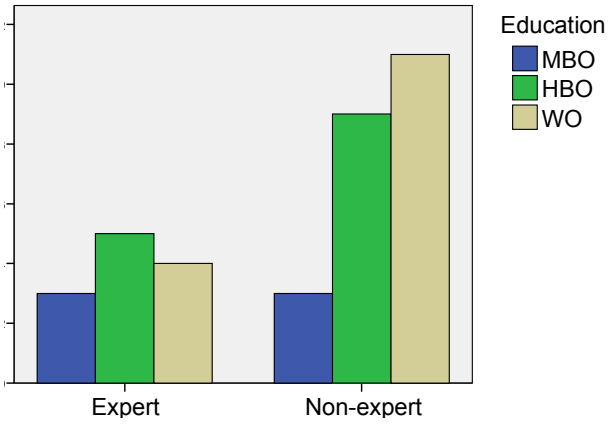
0. Did not influence my answer
1. Only when I had no idea
2. I bought from the person that had the best chance according to statistics

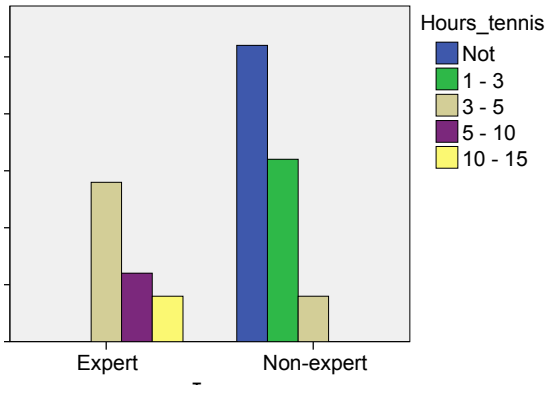
How_influenced_searched_info

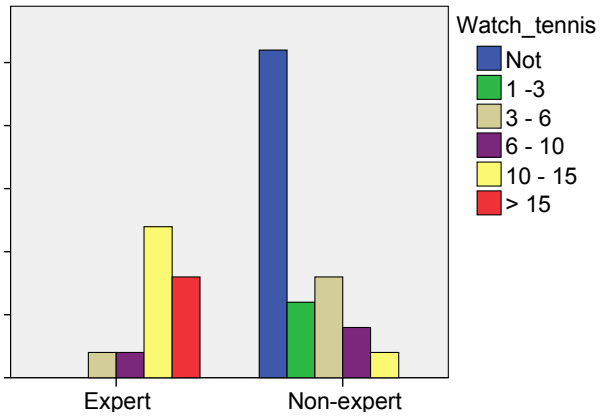
0. Did not influenced my answer
1. Only when I had no idea
2. I bought from the person that had the best chance according to the information sources

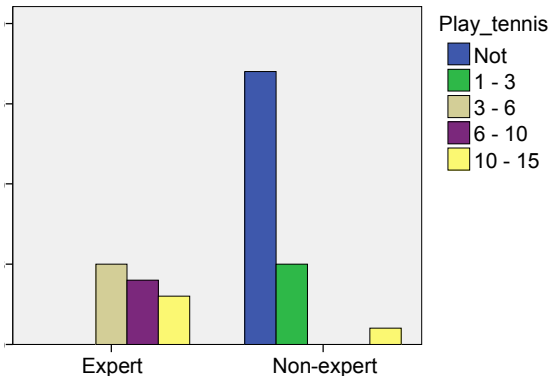
A.5: Results Survey Wimbledon 2009

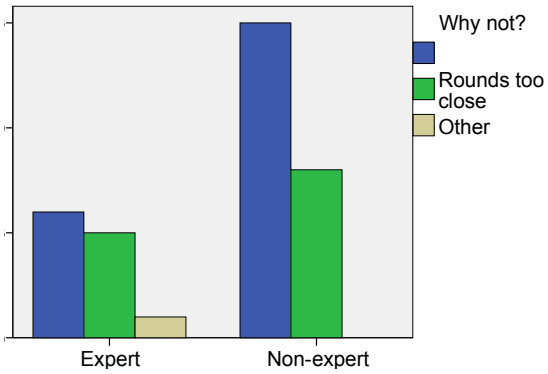


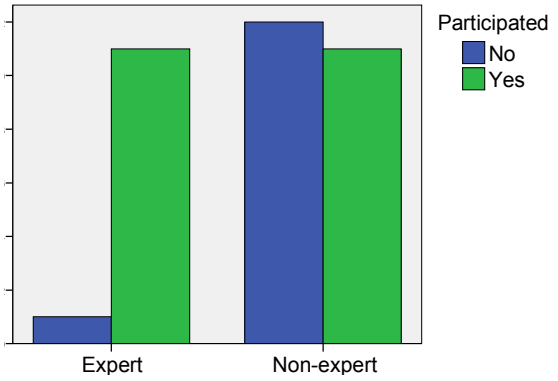


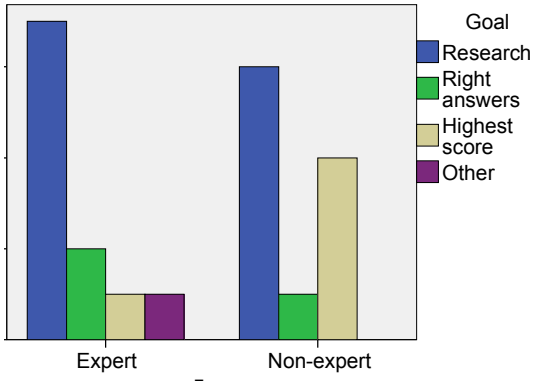


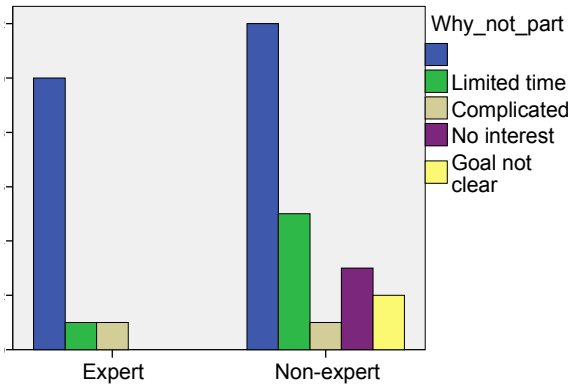


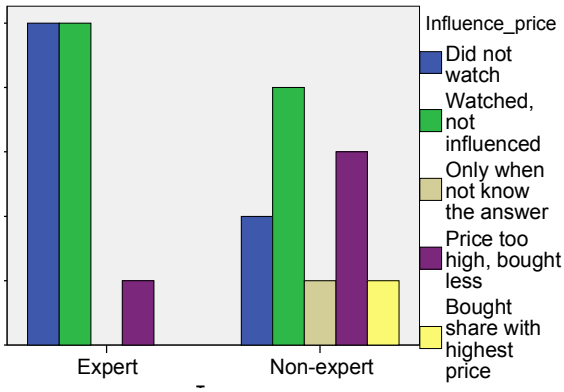

Play_tennis
Not
1 - 3
3 - 6
6 - 10
10 - 15
Expert
Non-expert

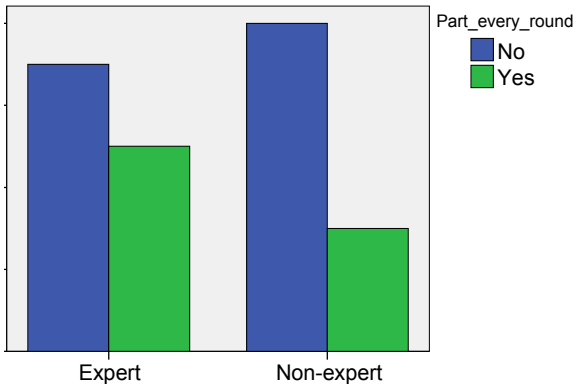

Why not?
Rounds too close
Other
Expert
Non-expert

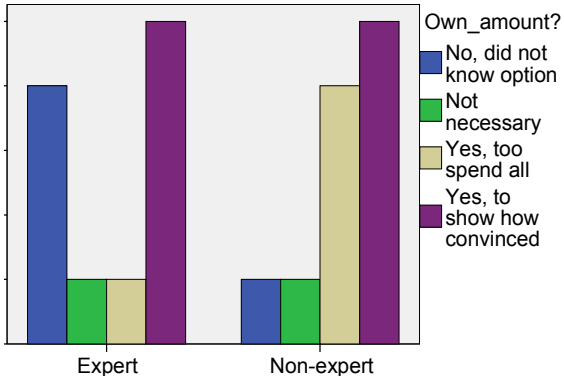

Participated
No
Yes
Expert
Non-expert

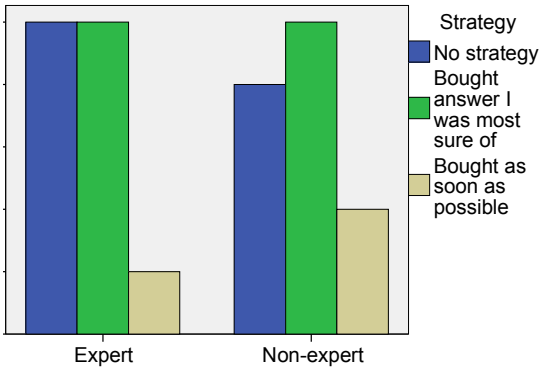

Goal
Research
Right answers
Highest score
Other
Expert
Non-expert

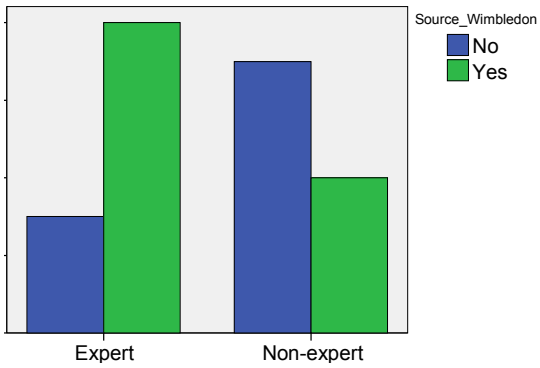

Why_not_part
Limited time
Complicated
No interest
Goal not clear
Expert
Non-expert

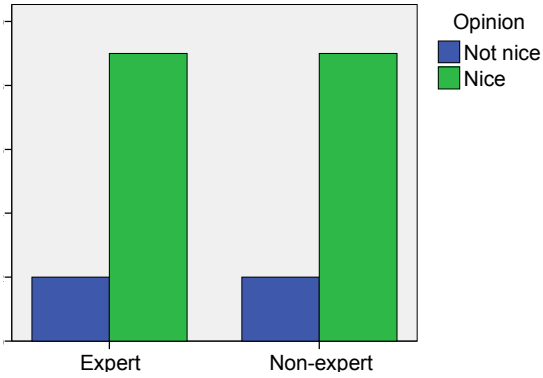

Influence_price
Did not watch
Watched, not influenced
Only when not know the answer
Price too high, bought less
Bought share with highest price
Expert
Non-expert

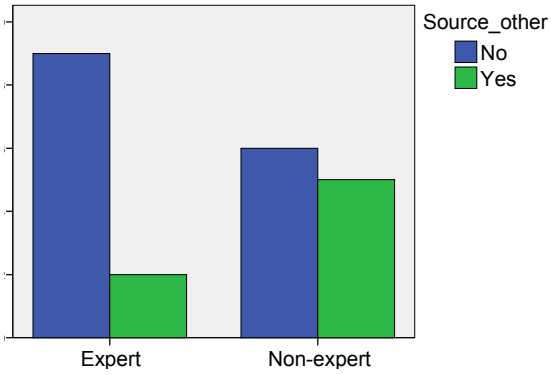

Part_every_round
No
Yes
Expert
Non-expert

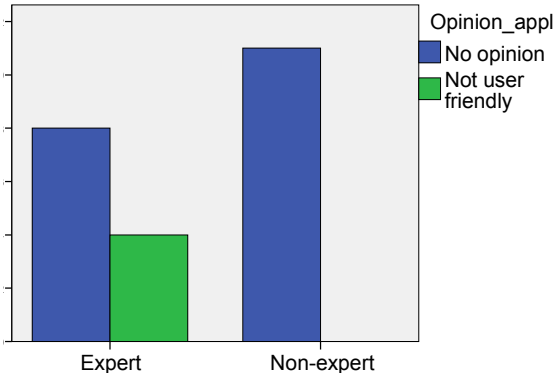

Own_amount?
No, did not know option
Not necessary
Yes, too spend all
Yes, to show how convinced
Expert
Non-expert

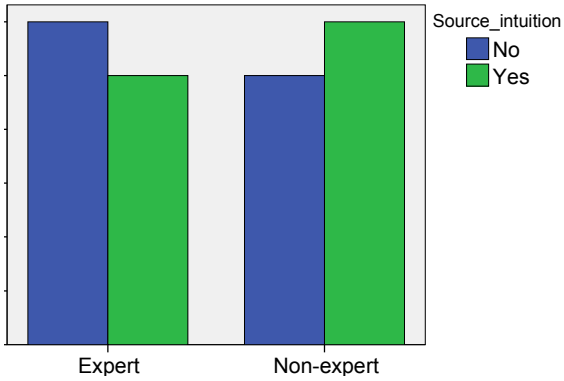

Strategy
No strategy
Bought answer I was most sure of
Bought as soon as possible
Expert
Non-expert

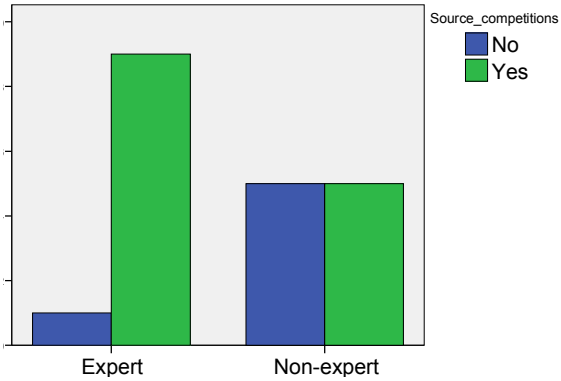

Source_Wimbledon
No
Yes
Expert
Non-expert

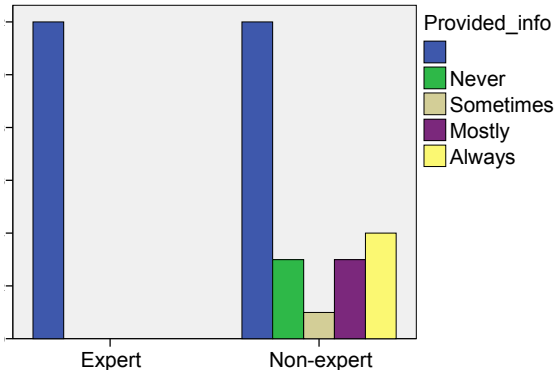

Opinion
Not nice
Nice
Expert
Non-expert

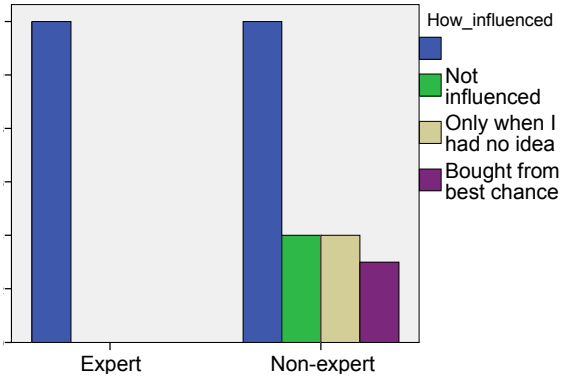

Source_other
No
Yes
Expert
Non-expert

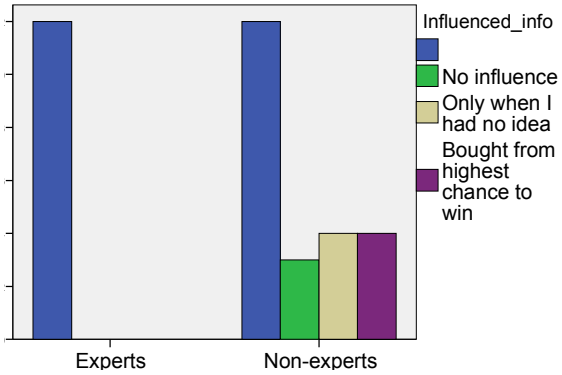

Opinion_appl
No opinion
Not user friendly
Expert
Non-expert

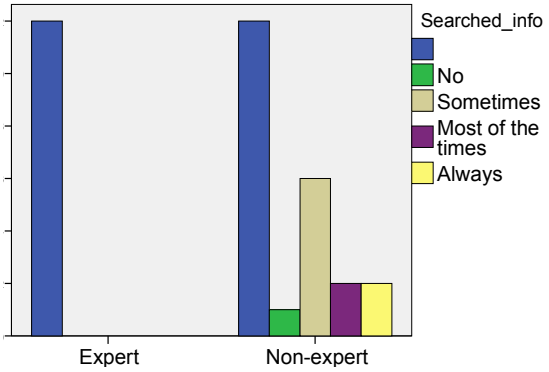

Source_intuition
No
Yes
Expert
Non-expert


Source_competitions
No
Yes
Expert
Non-expert


Provided_info
Never
Sometimes
Mostly
Always
Expert
Non-expert


How_influenced
Not influenced
Only when I had no idea
Bought from best chance
Expert
Non-expert


Influenced_info
No influence
Only when I had no idea
Bought from highest chance to win
Experts
Non-experts


Searched_info
No
Sometimes
Most of the times
Always
Expert
Non-expert

Appendix B: Overview of research papers

Topic	Article 1	Article 2	Article 3	Article 4	Article 5
Title	Predicting the World Cup in soccer: Performance and Confidence of experts and non-experts	Professional vs. amateur judgment accuracy: The case of foreign exchange rates	Probabilistic Forecasts of Stock Prices and Earnings: The Hazards of Nascent Expertise	Probabilistic Forecasting: An Experiment Related to the Stock Market	Predicting the outcomes of National Football League games
Subject	Soccer: World Cup 2002	Exchange rates	Stock market: Publicly traded companies	Stock market: shares on Stockholm Stock Exchange	Football league
Published	2005	2003	1991	1972	2003
Level 1	Experts (sport journalists, soccer fans and coaches)	Professionals (FX dealers and business professionals)	Semi-experts (graduate students in business)	Bankers	Weekly power scores in *New York Times*
Level 2	Swedish students (knowledgeable with information)	Amateurs (business students (not naïve))	Novices (undergraduate students in business)	Stock market experts	Naive market
Level 3	Swedish students (knowledgeable with no information)			Statisticians	Betting Market
Level 4	Swedish students (naïve with information)			Business teachers	Expert sports editor
Level 5	Swedish students (naïve with no information)			Students	Former NFL players/ coaches
Level 6	American students with information				

Topic	Article 1	Article 2	Article 3	Article 4	Article 5
Level 7	American students with no information				
How are the experts defined?	Professionals or fans	Professionals	Graduate business students	Not	Professionals
When experiment	May 2002	Before 2003	From December 1985 - March 1986	Before 1972	September 1994 - December 2000
Where experiment	Japan and Korea	Turkey	Michigan	Stockholm	New York
What forecasted (1)?	Outcome first round	One day horizon: point forecasts exchange rate	Probabilistic forecasts of change in earnings (ranges) of 31 companies	The buying stock prices of 12 shares for a 2 week period	What team wins NFL game
What forecasted (2)?		One day horizon: directional forecasts exchange rate	Probabilistic forecasts of change in stock prices (ranges) of 31 companies		
What forecasted (3)?		One day horizon: interval forecasts exchange rate			
What forecasted (4)?		One week horizon: point forecasts exchange rate			
What forecasted (5)?		One week horizon: directional forecasts exchange rate			
What forecasted (6)?		One week horizon: interval forecasts exchange rate			
How many predictions	8	300	62	120	1212

Topic	Article 1	Article 2	Article 3	Article 4	Article 5
Type of questionnaire 1	Instructions	Explanation about study and forecasting. No disclosure to other participants	1. Instructions and background information on target companies (revenues and share prices previous periods) 2. Information may be searched.	Instructions	Information from the power scores and other information that may be searched
Type of questionnaire 2	Instructions and ques about all teams				
Number of participants	251 participants	97 participants	31 participants	72 participants	Not known
Number level 1	52 participants	40 participants	17 participants	10	Not applicable
Type of questionnaire	1	1	1	1	
Mean experience	Not known	Not known	Not known	Not known	Not applicable
Number level 2	30 participants	57 participants	14 participants	10	Not applicable
Type of questionnaire	2	1	1	1	
Mean age	23	Not known	Not known	Not known	Not applicable
Mean experience		Not known	Not known	Not known	Not applicable
Number level 3	44 participants			11	Not known
Type of questionnaire	1			1	
Mean experience				Not known	Not known

Topic	Article 1	Article 2	Article 3	Article 4	Article 5
Number level 4	38 participants			13	1 participant
Type of questionnaire	2			1	1
Mean experience				Not known	Not known
Number level 5	54 participants			28	4 participants
Type of questionnaire	1			1	1
Mean experience				Not known	Not known
Number level 6	15 participants				
Type of questionnaire	2				
Mean experience					
Number level 7	18 participants				
Type of questionnaire	1				
Mean experience					
Incentives	Yes, for participation and performance, except for sport journalists and soccer coaches. It is not known how much	No, none of the participants had any (financial) incentives	Each participant received a token based payment of $5. The 5 overall best forecasters received an additional $30, $20, $15, $10 and $5	No, only students were allowed a seminar off from their course requirements	No, not mentioned

Topic	Article 1	Article 2	Article 3	Article 4	Article 5
Result (1)	Non-expert predict slightly, but not significantly better than experts	**Point forecasts**: professional judgements only outperform the amateurs significantly with the one-week predictions (based on MSE and the Theil decomposition)	Overall accuracy of price forecast: The novices are significantly more accurate than the semi-experts	In terms of accuracy, the order was as follows: statistician - stock market expert - university business student - university business teachers - bankers	Power scores, sports editor, betting market and assumption 'home team wins' all are better predictions then chance
Result (2)	Both groups outperform chance	**Point forecasts**: for both groups the one-day-ahead predictions were far more accurate than the one-week ahead forecasts (based on MSE)	Overall accuracy of price forecast: None of the subjects were very accurate in absolute terms: outperformed by several hypothetical constant forecasters	The average of the 9 people that made the best predictions the first 5 rounds has a better average weight in the second 4 rounds than any other group (equal weights).	Betting market made the most accurate predictions of all
Result (3)	Both groups are outperformed by a simple rule	**Point forecasts**: professionals' forecasts yielded significantly better values of MSE than amateurs for one-day and one-week ahead predictions	Mean earnings forecast patterns of both groups are similar.		Power scores are the second best predictors, slightly more accurate then the sports editor

Topic	Article 1	Article 2	Article 3	Article 4	Article 5
Result (4)	Participants with information do not outperform people without information	**Directional forecasts**: the professionals were significantly more accurate than the amateurs, especially in the one-week horizons	Overall accuracy of earnings both groups was significantly inferior to the other forecasters		Predictions based on the power scores is inferior to the naive model (home team wins)
Result (5)		**Directional forecasts**: for both groups the predictions of the one- week horizon is more accurate than the one-day horizon	The overall accuracy of the earnings forecasts was superior to the price forecasts, but only for the novices.\		
Result (6)		**Interval forecasts**: Both groups are significantly better in predicting the one day horizon than the one-week horizon			
Result (7)		Interval forecasts: there is no significant evidence that the professionals outperform the amateurs			

Appendix C: Experiment Wimbledon

C.1: Instructions prediction market

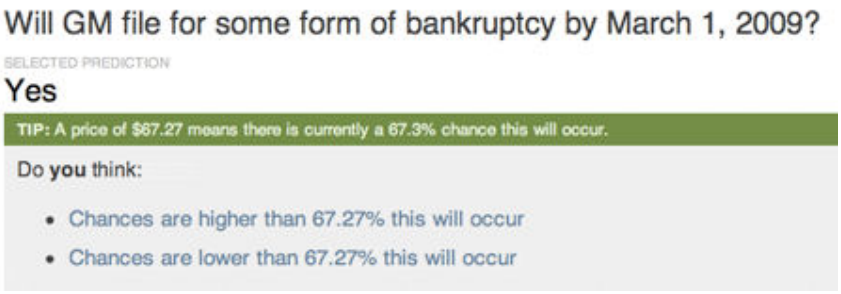
Handleiding Inkling Markets Platform

Het gebruik van de Inkling Markets Platform gaat als volgt:

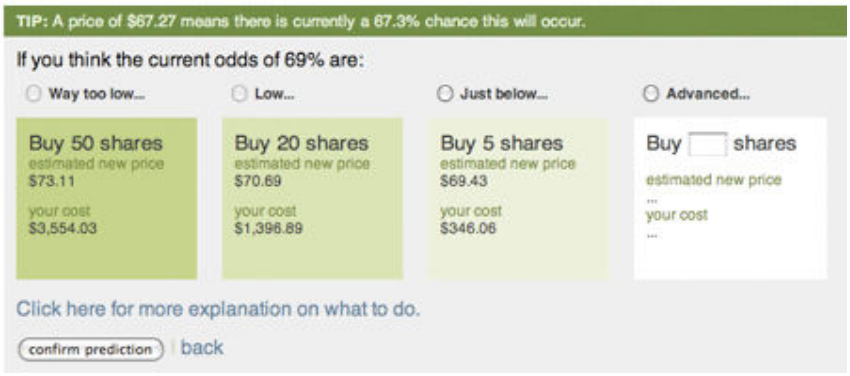
Stap 1:
Wanneer u zich registreert op Inkling Market ontvangt u $ 5000. U ontvangt een email met hyperlink wanneer er nieuwe vragen beschikbaar gesteld zijn. Indien u op de link klikt komt u uit bij de betreffende 'prediction market' die geopend is.

In onderstaand voorbeeld is de vraag 'Zal GM zich failliet laten verklaren voor 1 maart 2009'? Allereerst geeft u aan wat volgens u het antwoord op de vraag is door op het - volgens u - juiste antwoord te klikken. De deelnemer hier denkt dat het antwoord op deze vraag ' Ja' is.

Vervolgens kunt u aangeven of u denkt dat de kans dat dit antwoord zich voordoet, hoger of lager is dan de huidige voorspelling van de deelnemers. In onderstaand voorbeeld denkt 67,27% van de deelnemers dat het antwoord op de vraag 'Ja' is. Door te klikken op 1 van de 2 opties geeft u aan of u denkt dat de kans groter of kleiner dan 67,29% is dat de daadwerkelijke uitkomst 'Ja' zal zijn.

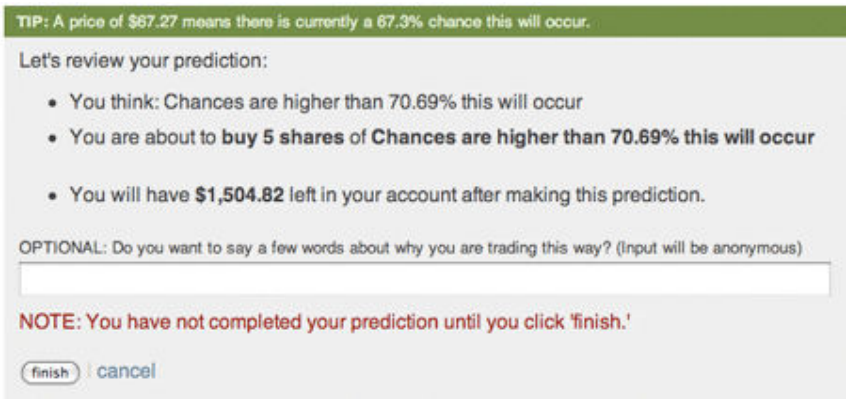


Stap 2:
Nu kunt u aangeven hoe sterk u overtuigd bent van de uitkomst van de voorspelling. Wanneer u niet erg overtuigd bent dat het antwoord 'Ja' zal zijn, koopt u slechts 5 aandelen, indien u zeer overtuigd bent dat het antwoord 'Ja' is, koopt u 50 aandelen. De prijs per aandeel is gelijk aan de kans dat voorspeld wordt dat het antwoord 'Ja' is. In bovenstaande situatie kost een aandeel per stuk dus $ 67,27. U kunt ook zelf het aantal aandelen bepalen door de meest rechtse optie te kiezen en zelf het aantal aandelen in te tikken.



Stap 3:

Als laatst worden al uw beslissingen nog een keer op een rijtje gezet met daarbij het bedrag dat u over heeft om te beleggen. Ook kunt u anomiem aangeven waarom u op deze manier gehandeld heeft. Vervolgens klikt u op ‘ Finish’ en bent u klaar!

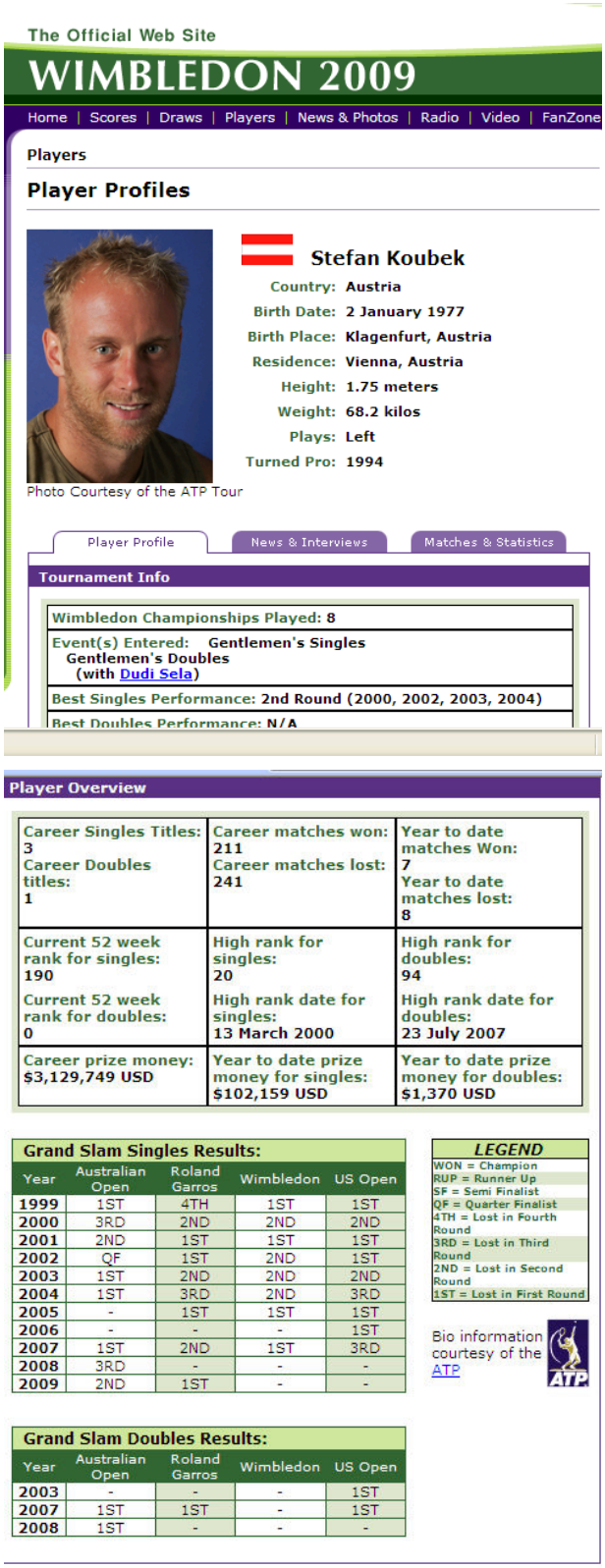


Indien u voorspelling achteraf waar blijkt te zijn, is het antwoord 100% waar en dus
$ 100 waard. Inkling Market betaalt dan ($ 100 - $ 65) * aantal gekochte aandelen uit. Wanneer het antwoord niet juist blijkt te zijn, verliest u $ 65 * aantal aandelen, aangezien het aandeel nu $ 0 waard blijkt te zijn.

Klik voor een uitgebreidere uitleg op onderstaande link en navigeer door de schermen: http://home.inklingmarkets.com/help/help.

Neem bij problemen contact op met mij via danielle.almeida@live.nl of 308780da@student.eur.nl.

C.2: Additional information non-experts



The Official Web Site

WIMBLEDON 2009

Home | Scores | Draws | Players | News & Photos | Radio | Video | FanZone

Players

Player Profiles

Stefan Koubek

Country: **Austria**
Birth Date: **2 January 1977**
Birth Place: **Klagenfurt, Austria**
Residence: **Vienna, Austria**
Height: **1.75 meters**
Weight: **68.2 kilos**
Plays: **Left**
Turned Pro: **1994**

Photo Courtesy of the ATP Tour

Player Profile | News & Interviews | Matches & Statistics

Tournament Info

Wimbledon Championships Played: **8**
Event(s) Entered: **Gentlemen's Singles** **Gentlemen's Doubles** **(with Dudi Sela)**
Best Singles Performance: **2nd Round (2000, 2002, 2003, 2004)**
Best Doubles Performance: **N/A**

Player Overview

Career Singles Titles: **3** Career Doubles titles: **1**	Career matches won: **211** Career matches lost: **241**	Year to date matches Won: **7** Year to date matches lost: **8**
Current 52 week rank for singles: **190** Current 52 week rank for doubles: **0**	High rank for singles: **20** High rank date for singles: **13 March 2000**	High rank for doubles: **94** High rank date for doubles: **23 July 2007**
Career prize money: **$3,129,749 USD**	Year to date prize money for singles: **$102,159 USD**	Year to date prize money for doubles: **$1,370 USD**

Grand Slam Singles Results:

Year	Australian Open	Roland Garros	Wimbledon	US Open
1999	1ST	4TH	1ST	1ST
2000	3RD	2ND	2ND	2ND
2001	2ND	1ST	1ST	1ST
2002	QF	1ST	2ND	1ST
2003	1ST	2ND	2ND	2ND
2004	1ST	3RD	2ND	3RD
2005	-	1ST	1ST	1ST
2006	-	-	-	1ST
2007	1ST	2ND	1ST	3RD
2008	3RD	-	-	-
2009	2ND	1ST	-	-

LEGEND

WON = Champion
RUP = Runner Up
SF = Semi Finalist
QF = Quarter Finalist
4TH = Lost in Fourth Round
3RD = Lost in Third Round
2ND = Lost in Second Round
1ST = Lost in First Round

Bio information courtesy of the ATP

Grand Slam Doubles Results:

Year	Australian Open	Roland Garros	Wimbledon	US Open
2003	-	-	-	1ST
2007	1ST	1ST	-	1ST
2008	1ST	-	-	-

Source: official Wimbledon website www.wimbledon.org

C.3: Results type of questions

Correct answers type of questions = 1 (who wins)

Type * Answer right = 1, answer wrong = 0 Crosstabulation

			Answer right = 1, answer wrong = 0		
			0	1	Total
Type	1	Count	7	13	20
		Expected Count	7.0	13.0	20.0
		% within Type	35.0%	65.0%	100.0%
	2	Count	7	13	20
		Expected Count	7.0	13.0	20.0
		% within Type	35.0%	65.0%	100.0%
Total		Count	14	26	40
		Expected Count	14.0	26.0	40.0
		% within Type	35.0%	65.0%	100.0%

Chi-Square Tests

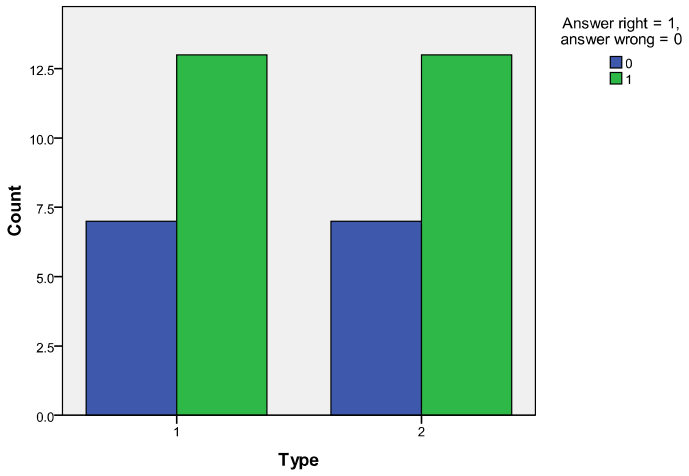
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.000[a]	1	1.000	1.000	.629	
Continuity Correction[b]	.000	1	1.000			
Likelihood Ratio	.000	1	1.000	1.000	.629	
Fisher's Exact Test				1.000	.629	
Linear-by-Linear Association	.000[c]	1	1.000	1.000	.629	.259
N of Valid Cases	40					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.00.

b. Computed only for a 2x2 table

c. The standardized statistic is .000.

Bar Chart



Correct answers type of questions = 2 (how many sets)

Type * Answer right = 1, answer wrong = 0 Crosstabulation

			Answer right = 1, answer wrong = 0		
			0	1	Total
Type	1	Count	8	11	19
		Expected Count	9.5	9.5	19.0
		% within Type	42.1%	57.9%	100.0%
	2	Count	11	8	19
		Expected Count	9.5	9.5	19.0
		% within Type	57.9%	42.1%	100.0%
Total		Count	19	19	38
		Expected Count	19.0	19.0	38.0
		% within Type	50.0%	50.0%	100.0%

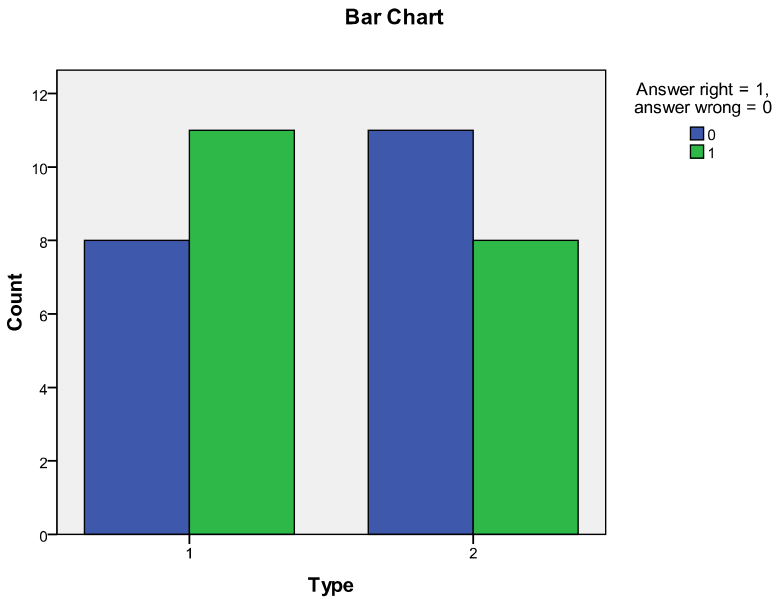
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.947[a]	1	.330	.517	.259	
Continuity Correction[b]	.421	1	.516			
Likelihood Ratio	.951	1	.329	.517	.259	
Fisher's Exact Test				.517	.259	
Linear-by-Linear Association	.922[c]	1	.337	.517	.259	.162
N of Valid Cases	38					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.50.

b. Computed only for a 2x2 table

c. The standardized statistic is -.960.



Stock value and average wealth with type of questions = 1 (who wins)

Ranks

	Type	N	Mean Rank	Sum of Ranks
Stock_value_right_answer	1	20	20.80	416.00
	2	20	20.20	404.00
	Total	40		
Average_wealth	1	20	19.95	399.00
	2	20	21.05	421.00
	Total	40		

Test Statistics[b]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	194.000	189.000
Wilcoxon W	404.000	399.000
Z	-.162	-.298
Asymp. Sig. (2-tailed)	.871	.766
Exact Sig. [2*(1-tailed Sig.)]	.883[a]	.779[a]
Exact Sig. (2-tailed)	.883	.779
Exact Sig. (1-tailed)	.442	.389
Point Probability	.011	.010

a. Not corrected for ties.

b. Grouping Variable: Type

Stock value type and average wealth of questions = 2 (how many sets)

Ranks

	Type	N	Mean Rank	Sum of Ranks
Stock_value_right_answer	1	19	20.68	393.00
	2	19	18.32	348.00
	Total	38		
Average_wealth	1	19	21.63	411.00
	2	19	17.37	330.00
	Total	38		

Test Statistics[b]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	158.000	140.000
Wilcoxon W	348.000	330.000
Z	-.657	-1.182
Asymp. Sig. (2-tailed)	.511	.237
Exact Sig. [2*(1-tailed Sig.)]	.525[a]	.246[a]
Exact Sig. (2-tailed)	.525	.246
Exact Sig. (1-tailed)	.263	.123
Point Probability	.009	.006

a. Not corrected for ties.

b. Grouping Variable: Type

C.4: Results number of answers

Correct answers number of answers = 2

Type * Answer right = 1, answer wrong = 0 Crosstabulation

			Answer right = 1, answer wrong = 0		
			0	1	Total
Type	1	Count	9	20	29
		Expected Count	10.5	18.5	29.0
		% within Type	31.0%	69.0%	100.0%
	2	Count	12	17	29
		Expected Count	10.5	18.5	29.0
		% within Type	41.4%	58.6%	100.0%
Total		Count	21	37	58
		Expected Count	21.0	37.0	58.0
		% within Type	36.2%	63.8%	100.0%

Chi-Square Tests

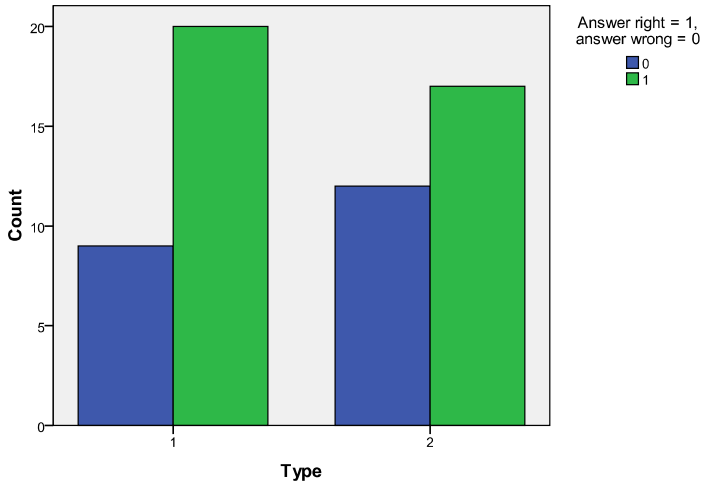
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.672[a]	1	.412	.585	.293	
Continuity Correction[b]	.299	1	.585			
Likelihood Ratio	.674	1	.412	.585	.293	
Fisher's Exact Test				.585	.293	
Linear-by-Linear Association	.660[c]	1	.416	.585	.293	.155
N of Valid Cases	58					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.50.

b. Computed only for a 2x2 table

c. The standardized statistic is -.813.

Bar Chart



Correct answers number of answers = 3

Type * Answer right = 1, answer wrong = 0 Crosstabulation

			Answer right = 1, answer wrong = 0		
			0	1	Total
Type	1	Count	6	4	10
		Expected Count	6.0	4.0	10.0
		% within Type	60.0%	40.0%	100.0%
	2	Count	6	4	10
		Expected Count	6.0	4.0	10.0
		% within Type	60.0%	40.0%	100.0%
Total		Count	12	8	20
		Expected Count	12.0	8.0	20.0
		% within Type	60.0%	40.0%	100.0%

Chi-Square Tests

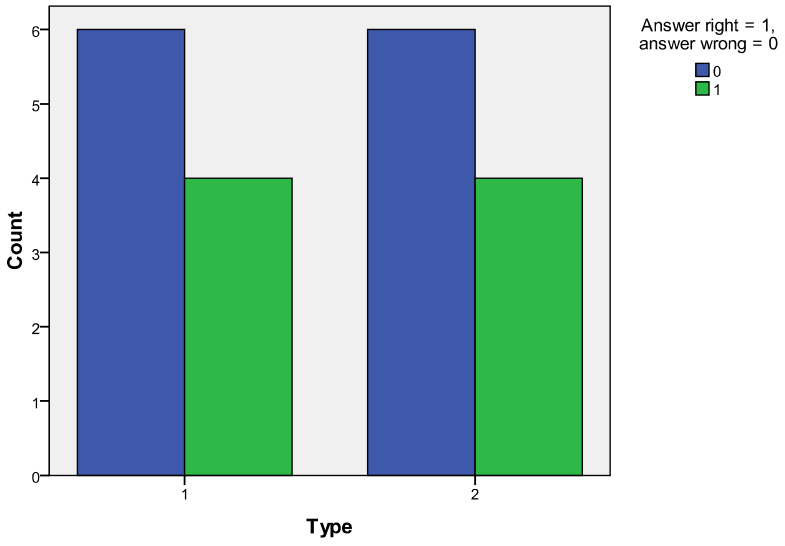
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.000[a]	1	1.000	1.000	.675	
Continuity Correction[b]	.000	1	1.000			
Likelihood Ratio	.000	1	1.000	1.000	.675	
Fisher's Exact Test				1.000	.675	
Linear-by-Linear Association	.000[c]	1	1.000	1.000	.675	.350
N of Valid Cases	20					

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 4.00.

b. Computed only for a 2x2 table

c. The standardized statistic is .000.

Bar Chart



Stock value and average wealth when number of answers = 2

Ranks

	Type	N	Mean Rank	Sum of Ranks
Stock_value_right_answer	1	29	30.38	881.00
	2	29	28.62	830.00
	Total	58		
Average_wealth	1	29	30.00	870.00
	2	29	29.00	841.00
	Total	58		

Test Statistics[a]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	395.000	406.000
Wilcoxon W	830.000	841.000
Z	-.397	-.225
Asymp. Sig. (2-tailed)	.692	.822
Exact Sig. (2-tailed)	.697	.829
Exact Sig. (1-tailed)	.348	.414
Point Probability	.003	.006

a. Grouping Variable: Type

Stock value and average wealth when number of answers = 3

Ranks

	Type	N	Mean Rank	Sum of Ranks
Stock_value_right_answer	1	10	11.40	114.00
	2	10	9.60	96.00
	Total	20		
Average_wealth	1	10	11.20	112.00
	2	10	9.80	98.00
	Total	20		

Test Statistics[b]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	41.000	43.000
Wilcoxon W	96.000	98.000
Z	-.680	-.529
Asymp. Sig. (2-tailed)	.496	.597
Exact Sig. [2*(1-tailed Sig.)]	.529[a]	.631[a]
Exact Sig. (2-tailed)	.529	.631
Exact Sig. (1-tailed)	.264	.315
Point Probability	.024	.026

a. Not corrected for ties.

b. Grouping Variable: Type

C.5: Results type of information

Correct answer type of information = 1

Type * Answer right = 1, answer wrong = 0 Crosstabulation

			Answer right = 1, answer wrong = 0		
			0	1	Total
Type	1	Count	2	10	12
		Expected Count	3.5	8.5	12.0
		% within Type	16.7%	83.3%	100.0%
	2	Count	5	7	12
		Expected Count	3.5	8.5	12.0
		% within Type	41.7%	58.3%	100.0%
Total		Count	7	17	24
		Expected Count	7.0	17.0	24.0
		% within Type	29.2%	70.8%	100.0%

Chi-Square Tests

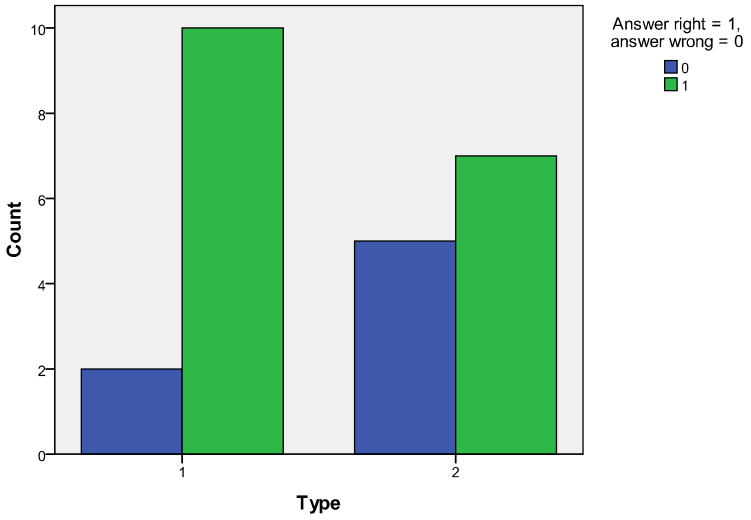
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1.815[a]	1	.178	.371	.185	
Continuity Correction[b]	.807	1	.369			
Likelihood Ratio	1.860	1	.173	.371	.185	
Fisher's Exact Test				.371	.185	
Linear-by-Linear Association	1.739[c]	1	.187	.371	.185	.151
N of Valid Cases	24					

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.50.

b. Computed only for a 2x2 table

c. The standardized statistic is -1.319.

Bar Chart



Correct answer type of information = 2

Type * Answer right = 1, answer wrong = 0 Crosstabulation

			Answer right = 1, answer wrong = 0		
			0	1	Total
Type	1	Count	11	5	16
		Expected Count	10.5	5.5	16.0
		% within Type	68.8%	31.3%	100.0%
	2	Count	10	6	16
		Expected Count	10.5	5.5	16.0
		% within Type	62.5%	37.5%	100.0%
Total		Count	21	11	32
		Expected Count	21.0	11.0	32.0
		% within Type	65.6%	34.4%	100.0%

Chi-Square Tests

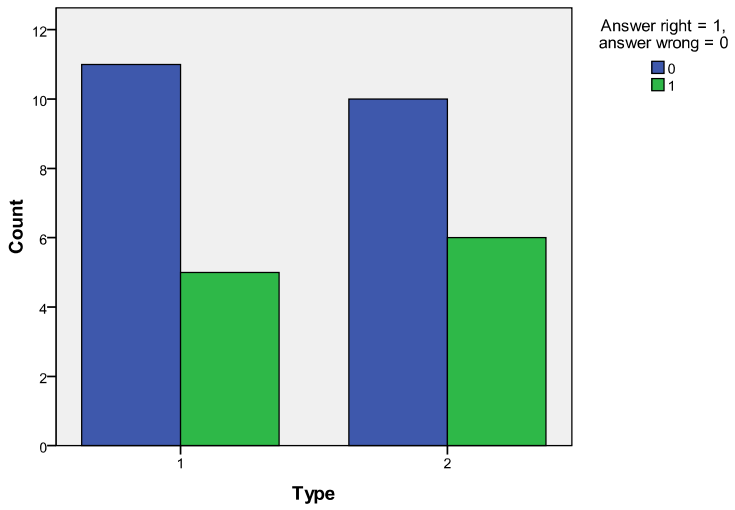
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.139[a]	1	.710	1.000	.500	
Continuity Correction[b]	.000	1	1.000			
Likelihood Ratio	.139	1	.710	1.000	.500	
Fisher's Exact Test				1.000	.500	
Linear-by-Linear Association	.134[c]	1	.714	1.000	.500	.271
N of Valid Cases	32					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.50.

b. Computed only for a 2x2 table

c. The standardized statistic is .366.

Bar Chart



Correct answer type of information = 3

Type * Answer right = 1, answer wrong = 0 Crosstabulation

			Answer right = 1, answer wrong = 0		
			0	1	Total
Type	1	Count	2	9	11
		Expected Count	2.5	8.5	11.0
		% within Type	18.2%	81.8%	100.0%
	2	Count	3	8	11
		Expected Count	2.5	8.5	11.0
		% within Type	27.3%	72.7%	100.0%
Total		Count	5	17	22
		Expected Count	5.0	17.0	22.0
		% within Type	22.7%	77.3%	100.0%

Chi-Square Tests

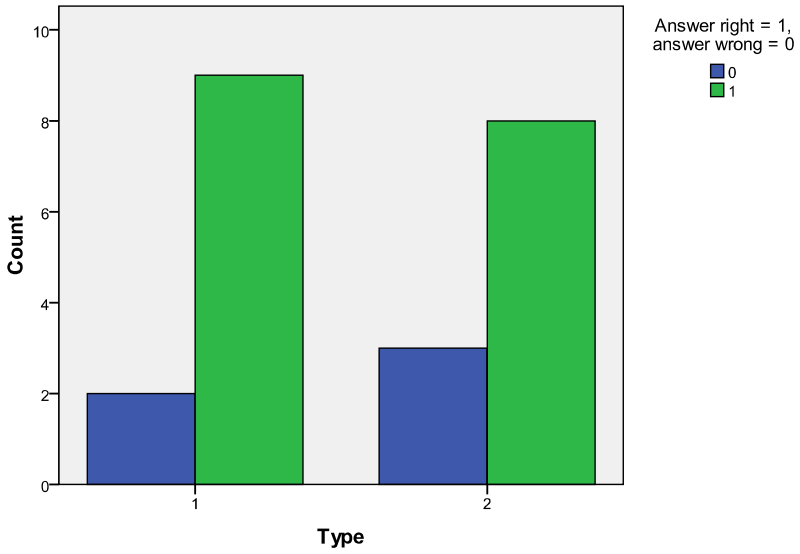
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.259[a]	1	.611	1.000	.500	
Continuity Correction[b]	.000	1	1.000			
Likelihood Ratio	.260	1	.610	1.000	.500	
Fisher's Exact Test				1.000	.500	
Linear-by-Linear Association	.247[c]	1	.619	1.000	.500	.345
N of Valid Cases	22					

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.50.

b. Computed only for a 2x2 table

c. The standardized statistic is -.497.

Bar Chart



Stock value and average wealth when type of information = 1

Ranks

	Type	N	Mean Rank	Sum of Ranks
Stock_value_right_answer	1	12	13.08	157.00
	2	12	11.92	143.00
	Total	24		
Average_wealth	1	12	13.33	160.00
	2	12	11.67	140.00
	Total	24		

Test Statistics[b]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	65.000	62.000
Wilcoxon W	143.000	140.000
Z	-.404	-.577
Asymp. Sig. (2-tailed)	.686	.564
Exact Sig. [2*(1-tailed Sig.)]	.713[a]	.590[a]
Exact Sig. (2-tailed)	.713	.590
Exact Sig. (1-tailed)	.356	.295
Point Probability	.021	.019

a. Not corrected for ties.

b. Grouping Variable: Type

Stock value and average wealth when type of information = 2

Ranks

	Type	N	Mean Rank	Sum of Ranks
Stock_value_right_answer	1	16	17.13	274.00
	2	16	15.88	254.00
	Total	32		
Average_wealth	1	16	17.25	276.00
	2	16	15.75	252.00
	Total	32		

Test Statistics[b]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	118.000	116.000
Wilcoxon W	254.000	252.000
Z	-.377	-.452
Asymp. Sig. (2-tailed)	.706	.651
Exact Sig. [2*(1-tailed Sig.)]	.724[a]	.669[a]
Exact Sig. (2-tailed)	.724	.669
Exact Sig. (1-tailed)	.362	.334
Point Probability	.014	.013

a. Not corrected for ties.

b. Grouping Variable: Type

Stock value and average wealth when type of information = 3

Ranks

	Type	N	Mean Rank	Sum of Ranks
Stock_value_right_answer	**1**	**11**	11.36	125.00
	2	**11**	11.64	128.00
	Total	22		
Average_wealth	**1**	**11**	10.73	118.00
	2	**11**	12.27	135.00
	Total	22		

Test Statistics[b]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	59.000	52.000
Wilcoxon W	125.000	118.000
Z	-.098	-.558
Asymp. Sig. (2-tailed)	.922	.577
Exact Sig. [2*(1-tailed Sig.)]	.949[a]	.606[a]
Exact Sig. (2-tailed)	.949	.606
Exact Sig. (1-tailed)	.474	.303
Point Probability	.026	.022

a. Not corrected for ties.

b. Grouping Variable: Type

C.6: Results scale participants

Correct answer when same scale of participants

Type * Answer right = 1, answer wrong = 0 Crosstabulation

			Answer right = 1, answer wrong = 0		
			0	1	Total
Type	1	Count	12	20	32
		Expected Count	13.5	18.5	32.0
		% within Type	37.5%	62.5%	100.0%
	2	Count	15	17	32
		Expected Count	13.5	18.5	32.0
		% within Type	46.9%	53.1%	100.0%
Total		Count	27	37	64
		Expected Count	27.0	37.0	64.0
		% within Type	42.2%	57.8%	100.0%

Chi-Square Tests

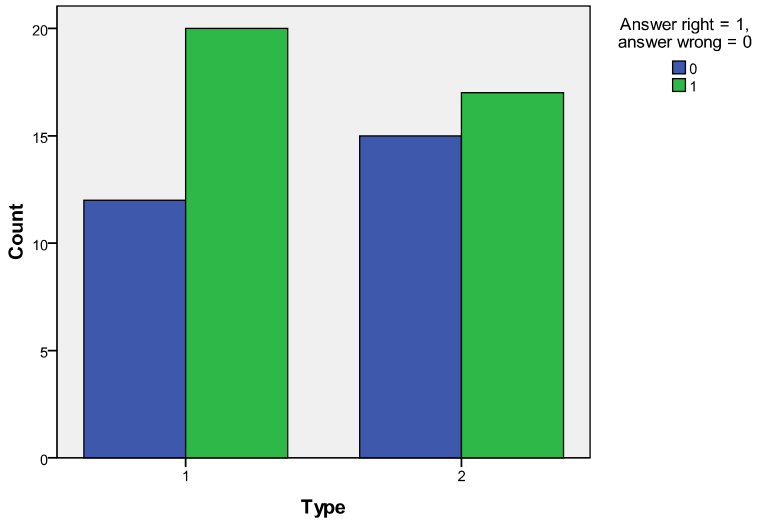
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.577[a]	1	.448	.613	.307	
Continuity Correction[b]	.256	1	.613			
Likelihood Ratio	.578	1	.447	.613	.307	
Fisher's Exact Test				.613	.307	
Linear-by-Linear Association	.568[c]	1	.451	.613	.307	.151
N of Valid Cases	64					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.50.

b. Computed only for a 2x2 table

c. The standardized statistic is -.753.

Bar Chart



Stock value and average wealth when same scale of participants

Ranks

	Type	N	Mean Rank	Sum of Ranks
Stock_value_right_answer	1	32	33.44	1070.00
	2	32	31.56	1010.00
	Total	64		
Average_wealth	1	32	33.75	1080.00
	2	32	31.25	1000.00
	Total	64		

Test Statistics[a]

	Stock_value_right_answer	Average_wealth
Mann-Whitney U	482.000	472.000
Wilcoxon W	1010.000	1000.000
Z	-.403	-.537
Asymp. Sig. (2-tailed)	.687	.591
Exact Sig. (2-tailed)	.694	.598
Exact Sig. (1-tailed)	.347	.299
Point Probability	.005	.005

a. Grouping Variable: Type

C.7 Table of Results Experiment Wimbledon Case

Nr	# Experts	Experts	# Crowd	Crowd	Info*	Average wealth experts	Average wealth crowd
1		41.77		46.01	3		
	13	**58.23**	12	**53.99**	3	-345.34	-318.43
2		43.73		**54.1**	**2**		
	15	**56.27**	13	45.9	2	-222.37	151.23
3		30.06		27.05	2		
		33.22		26.51	2		
	14	**36.72**	7	**46.43**	2	-184.52	-434.89
4		**60.73**		43.53	1		
	13	39.27	9	**56.47**	1	268.86	-381.25
5		**52.0**		**59.3**	**1**		
	13	48.0	6	40.7	1	75.29	582.13
6		38.13		**50.99**	**3**		
	15	**61.87**	8	49.01	3	-451.67	61.87
1		49.81		49.7	1		
	10	**50.19**	6	**50.3**	1	-114.62	-25.08
2		48.81		44.23	2		
	10	**51.19**	8	**55.77**	2	-60.72	-128.98
3		31.75		30.92	2		
		33.72		**35.58**	2		
	9	**34.53**	7	33.5	2	-135.06	-74.76
4		**60.74**		**56.37**	**3**		
	10	39.26	6	43.63	3	486.06	528.75
5		**38.96**		**38.33**	**3**		
		30.52		29.66	3		
	8	30.52	8	32	3	331.69	435.89
6		**75.18**		**69**	**1**		
	9	24.82	9	31	1	1132.78	892.83
1		**54.59**		**53.89**	**3**		
	11	45.41	9	46.11	3	142.02	208.22
2		**61.31**		**73.27**	**3**		
	11	38.69	12	26.73	3	463.13	801.3
3		**50.59**		**50.99**	**1**		
	10	49.41	9	49.01	1	29.82	55
4		**56.95**		**64.57**	**1**		
	9	43.05	10	35.43	1	361.75	639.5
5		**36.18**		**35.39**	**2**		
		32.1		30.75	2		
	9	31.71	11	33.85	2	228.33	149.19
6		37.28		36.72	2		
	11	**62.72**	9	**63.28**	2	-666.88	-645.51

1		32.69		31.04	1			
		32.17		**37.92**	1			
	9	**35.14**	5	31.04	1	-53.9	-349.33	
2		**67.17**		**74.65**	**1**			
	9	32.83	8	25.35	1	820.11	1152.48	
3		31.9		**34.75**	**2**			
		36.7		33.93	2			
	6	31.39	6	31.31	2	-182.61	179.24	
4		48		46.21	2			
	9	**52**	7	**53.79**	2	93.22	-411.05	
5		57.73		46.41	3			
		42.27		53.59	3			
6		**63.65**		**59.58**	**3**			
	9	36.35	7	40.42	3	142.46	398.46	
1		34.2		**35.22**	**2**			
		34.34		34.65	2			
	9	31.46	9	30.12	2	71.81	152.55	
2		35.89		32.38	2			
	9	**64.11**	10	**67.62**	2	-920.76	-1085.6	
3		**54.49**		48.1	3			
	9	45.51	8	**51.9**	3	238.76	-121.01	
4		**70.44**		**72.4**	**3**			
	10	29.56	8	27.6	3	856.6	1156.48	
5		**53.19**		**51.8**	**1**			
	7	46.81	7	48.2	1	221.26	126.25	
6		**63.46**		**68.75**	**1**			
	8	36.54	9	31.25	1	851.38	884.19	
1		**36.47**		32.61	1			
		32.21		31.33	1			
	5	31.32	6	**36.05**	1	448.95	-90.62	
2		**52.39**		43.63	1			
	6	47.61	8	**56.37**	1	195.2	-429.27	
3		**39.84**		32.98	2			
		26.48		**34.45**	2			
	7	33.67	7	32.57	2	636.42	-39.14	
4		**79.12**		**69.6**	**2**			
	9	20.88	8	30.4	2	1274.74	1019.59	
5		**52.9**		46.51	3			
	7	47.1	6	**53.49**	3	215.47	-301.87	
6		**57.16**		**65.75**	**3**			
	8	42.84	6	34.25	3	417.71	1140.76	
1		**74.73**		**61.59**	**2**			
	8	25.27	4	38.41	2	-1223.58	-762.21	
2		24.85		29.5	2			
		42.13		**43.15**	2			
	6	33.02	4	27.34	2	1255.6	1302.54	
3		**52.69**		48.4	2			
	7	47.31	3	**51.6**	2	187.65	-270.93	
4		44.32		41.09	2			
	7	**55.68**	3	**58.91**	2	-430.3	-1634.28	

Appendix D: Results obtained data

D.1: AEX-index

Correct answer one-month predictions

Test Statistics[a]

	Perc_right_Short
Mann-Whitney U	4135.000
Wilcoxon W	8321.000
Z	-.015
Asymp. Sig. (2-tailed)	.988
Exact Sig. (2-tailed)	.988
Exact Sig. (1-tailed)	.494
Point Probability	.001

a. Grouping Variable: 1 = expert, 2 = non-expert

Chi-Square Tests

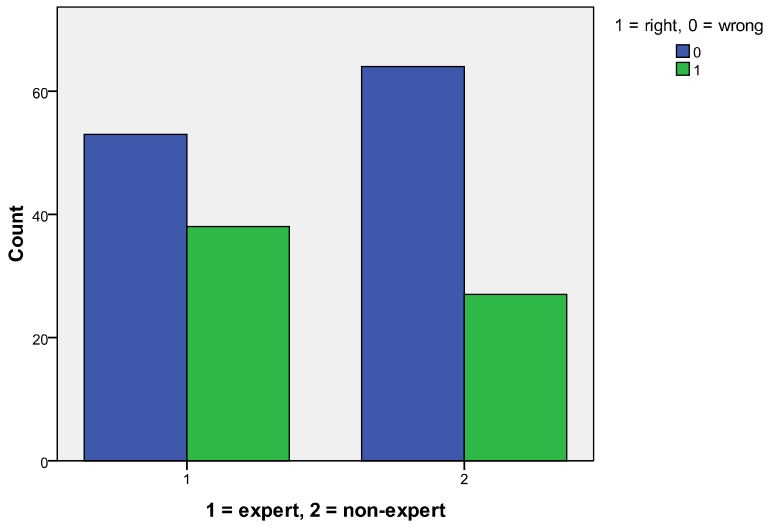
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	2.896[a]	1	.089	.122	.061	
Continuity Correction[b]	2.393	1	.122			
Likelihood Ratio	2.906	1	.088	.122	.061	
Fisher's Exact Test				.122	.061	
Linear-by-Linear Association	2.880[c]	1	.090	.122	.061	.029
N of Valid Cases	182					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 32.50.

b. Computed only for a 2x2 table

c. The standardized statistic is -1.697.

Bar Chart



Percentage correct answer one month prediction

Ranks

	1 = expert, 2 = non-expert	N	Mean Rank	Sum of Ranks
Perc_right_Short	1	91	91.44	8321.00
	2	91	91.56	8332.00
	Total	182		

Test Statistics[a]

	Perc_right_Short
Mann-Whitney U	4135.000
Wilcoxon W	8321.000
Z	-.015
Asymp. Sig. (2-tailed)	.988
Exact Sig. (2-tailed)	.988
Exact Sig. (1-tailed)	.494
Point Probability	.001

a. Grouping Variable: 1 = expert, 2 = non-expert

Correct answer six-month predictions

1 = expert, 2 = non-expert * Right_Wrong_Long Crosstabulation

			Right_Wrong_Long		
			0	1	Total
1 = expert, 2 = non-expert	1	Count	55	30	85
		Expected Count	58.0	27.0	85.0
		% within 1 = expert, 2 = non-expert	64.7%	35.3%	100.0%
	2	Count	61	24	85
		Expected Count	58.0	27.0	85.0
		% within 1 = expert, 2 = non-expert	71.8%	28.2%	100.0%
Total		Count	116	54	170
		Expected Count	116.0	54.0	170.0
		% within 1 = expert, 2 = non-expert	68.2%	31.8%	100.0%

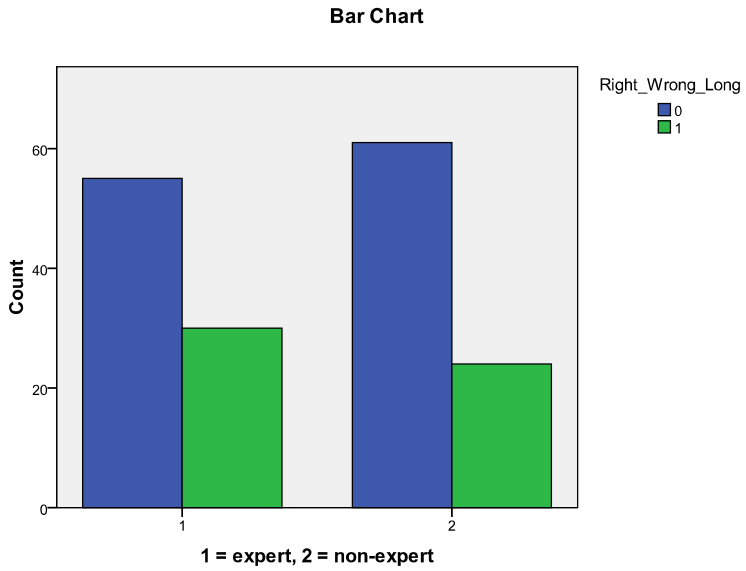
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.977[a]	1	.323	.410	.205	
Continuity Correction[b]	.678	1	.410			
Likelihood Ratio	.979	1	.323	.410	.205	
Fisher's Exact Test				.410	.205	
Linear-by-Linear Association	.971[c]	1	.324	.410	.205	.081
N of Valid Cases	170					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 27.00.

b. Computed only for a 2x2 table

c. The standardized statistic is -.986.



Percentage correct answer six months prediction

Ranks

1 = expert, 2 = non-expert		N	Mean Rank	Sum of Ranks
Perc_right_long	1	85	85.19	7241.50
	2	85	85.81	7293.50
	Total	170		

Test Statistics[a]

	Perc_right_long
Mann-Whitney U	3586.500
Wilcoxon W	7241.500
Z	-.081
Asymp. Sig. (2-tailed)	.935
Exact Sig. (2-tailed)	.936
Exact Sig. (1-tailed)	.468
Point Probability	.001

a. Grouping Variable: 1 = expert, 2 = non-expert

D.2: EC2008

Rules

Inleveren:
De uiterste inleverdatum is **vrijdag 6 juni om 12.00 uur**. Wees dus op tijd met inleveren. Inleveren kan door dit excelbestand digitaal per mail te versturen naar: ralf.bosman1@quion.com.
Prijzenpot:
Deelname aan deze EK-Poule bedraagt 5 euro. Dit bedrag graag uiterlijk 6 juni aan mij te betalen. De eerste prijs bedraagt 60% van de prijzenpot, de tweede prijs 30% en de derde prijs 10%. Bij een gelijk puntentotaal van meerdere deelnemers worden de prijzen verdeeld onder deze deelnemers (eindigen bijvoorbeeld twee personen op de eerste plaats, dan krijgen ze ieder (60 + 30)/2 = 45% van de pot.
Update tussenstand:
Er zal in de groepsfase minimaal één keer per twee dagen (afhankelijk van mijn tijd) een update zijn van de tussenstand. Vanaf de kwartfinale in ieder geval na elke ronde.
Wat dien je in te vullen:
Vul in het invulformulier de uitslagen in van alle 31 wedstrijden en geef antwoord op de zes bonusvragen. Oftewel vul alle oranje gearceerde velden in. In de kwartfinales, halve finales en finale dien je de standen na de reguliere speeltijd (dus na 90 minuten) te voorspellen. Indien een wedstrijd gelijk eindigt tellen in dit spel de eventuele verlenging en strafschoppenserie niet mee voor de punten die je kunt scoren bij je voorspelde uitslag. Indien er na de reguliere speeltijd van een wedstrijd een verlenging en/of strafschoppenserie aan te pas komt dien je de winnaar hiervan aan te geven in het groene vakje dat dan direct rechts naast de wedstrijd (in Kolom
Invullen uitslagen bepaalt je kampioen:
In deze EK-Poule heeft het invullen van de uitslagen van de wedstrijden ook consequenties voor de eindstanden van je groepsfase en het bepalen welke landen er doorgaan naar de kwartfinales, halve finales, finale en tenslotte bepaalt het ook welk land Europees Kampioen wordt. Door het invullen van de uitslagen bepaal je dus je Europees Kampioen. Al je uitslagen worden automatisch doorberekend en het schema wordt aan de hand van je uitslagen verder ingevuld. Het veranderen (overschrijven) van de ingevulde landen heeft geen zin aangezien ik alleen de oranje velden kopieer naar het bestand wat de punten gaat berekenen.
Punten
In het gehele spel zijn in totaal 300 punten te verdienen. Het grootste gedeelte (186 punten) is te verdienen door het goed voorspellen van de uitslagen van de wedstrijden. Verder zijn er in totaal 84 punten te behalen met je uitslagen waardoor landen in de groepseindstand op de juiste plek staan en wanneer een land daadwerkelijk de kwartfinale, halve finale en finale haalt en eventueel het toernooi wint. De resterende 30 punten zijn te behalen met de bonusvragen. - Er zijn 31 wedstrijden waarbij per wedstrijd maximaal 6 punten zijn te verdienen (max. 186 punten) - Het juist voorspellen van de positie van een land in de eindstand van de groepsfase levert 2 punten per land op (max. 32 punten) - Wanneer een land op de juiste plek staat in het schema van de kwartfinales verdien je nog 1 punt per land (bovenop de 2 punten voor de juiste positie in de groepsfase). Indien een land wel de kwartfinales haalt maar op een andere plek in het schema komt krijg je 2 punten per land (max. 8 punten) - Wanneer een land op de juiste plek staat in het schema van de halve finales verdien je 5 punten per land en indien een land op een andere plek in het schema de halve finales haalt 3 punten per land (max. 20 punten) - Wanneer een land de finale haalt krijg je 7 punten per land (max. 14 punten) - Indien je de Europees Kampioen goed voorspelt krijg je 10 punten (max. 10 punten) - Bij alle bonusvragen ontvang je maximaal 5 punten bij het goede antwoord. Bij de schattingsbonusvragen (aangegeven met een *) kun je echter ook minder punten verdienen indien je in de buurt van het goede antwo Bij de andere bonusvragen is het alles of niets (max. 30 punten)

Punten bij voorspelling uitslag:

Per wedstrijd zijn maximaal 6 punten te verdienen. Dit aantal is als volgt opgebouwd:
Juiste voorspelling toto-uitslag na reguliere speeltijd (welke ploeg wint of gelijkspel) = 2 punten
Juiste voorspelling aantal goals van een land = max. 2 punten (1 punt per land)
Juiste doelsaldo van een wedstrijd (met maximaal 1 goal afwijking per land) = 1 punt
Bonus bij een geheel correcte uitslag = 1 punt

Ook punten uitslag bij niet correcte voorspelling:

Indien je de uitslag niet correct hebt voorspeld kun je alsnog punten verdienen (zoals hierboven beschreven). Wanneer je bijvoorbeeld alleen de juiste winnaar hebt voorspeld krijg je nog twee punten of indien je 1-0 als voorspelling hebt en het wordt 1-1 krijg je 1 punt vanwege de correcte voorspelling van het aantal gescoorde doelpunten van een van de landen.

Paradox halve finale:

Omdat de uitslagen gekoppeld zijn aan het wedstrijdschema kan het in de halve finale gebeuren dat landen in werkelijkheid net omgekeerd in het wedstrijdschema komen dan dat jij hebt voorspeld. En dan kan de situatie ontstaan dat wanneer je bijvoorbeeld als halve finale Nederland – Spanje met een uitslag van 2-0 voorspelt uit het werkelijke schema de halve finale Spanje – Nederland komt. Dan voorspel je voor die wedstrijd eigenlijk

Schattingsbonusvragen:

Bij de bonusvragen met een * (de schattingsbonusvragen) kan maximaal 5 punten worden gescoord. Omdat de exacte antwoorden op deze vragen zeer lastig te voorspellen zijn worden echter ook punten toegekend, indien je antwoord zich binnen een marge van 20% van het juiste antwoord bevindt. Heb je het antwoord correct verdien je 5 punten, zit je er 1-5% van het correcte antwoord onder of boven krijg je 4 punten, bij 6-10% verschil 3 punten, 11-15% 2 punten en 16-20% 1 punt. Voorbeeld: er worden totaal 100 doelpunten gescoord op het EK en jij hebt 112 voorspeld, dan zit je 12% boven de werkelijke score en krijg je 2 punten.

Hoe wordt de groepseindstand bepaalt:

Om de eindstand van een groep te bepalen wordt achtereenvolgens gekeken naar:
- Het aantal behaalde punten van een land in alle groepsduels
- Indien meerdere landen hetzelfde puntenaantal hebben geldt het aantal punten behaalt in de onderlinge duels, vervolgens het doelsaldo in de onderlinge duels en tenslotte het aantal gescoorde goals in de onderlinge duels
- Mocht er nu nog geen onderscheid zijn tussen landen telt het doelsaldo in alle groepswedstrijden gevolgd door het aantal gescoorde goals in de groepswedstrijden.
- Tenslotte bepaalt het Uefa-coëfficient uit de kwalificatiereeksen voor het WK 2006 en EK 2008 welk land doorgaat
- Er is een uitzondering, zie hiervoor het tabblad Instructies

Overall results: Percentage correct answer

Ranks

1=expert, 2=crowd, 3=non expert		N	Mean Rank	Sum of Ranks
Perc_right	1.00	48	49.77	2389.00
	3.00	48	47.23	2267.00
	Total	96		

Test Statistics[a]

	Perc_right
Mann-Whitney U	1091.000
Wilcoxon W	2267.000
Z	-.448
Asymp. Sig. (2-tailed)	.654
Exact Sig. (2-tailed)	.657
Exact Sig. (1-tailed)	.328
Point Probability	.001

a. Grouping Variable: 1=expert, 2=crowd, 3=non expert

Overall results: Correct prediction

1=expert, 2=crowd, 3=non expert * 1=majority right, 0=majority wrong Crosstabulation

			1=majority right, 0=majority wrong		
			.00	1.00	Total
1=expert, 2=crowd, 3=non expert	1.00	Count	34	14	48
		Expected Count	36.5	11.5	48.0
		% within 1=expert, 2=crowd, 3=non expert	70.8%	29.2%	100.0%
	3.00	Count	39	9	48
		Expected Count	36.5	11.5	48.0
		% within 1=expert, 2=crowd, 3=non expert	81.3%	18.8%	100.0%
Total		Count	73	23	96
		Expected Count	73.0	23.0	96.0
		% within 1=expert, 2=crowd, 3=non expert	76.0%	24.0%	100.0%

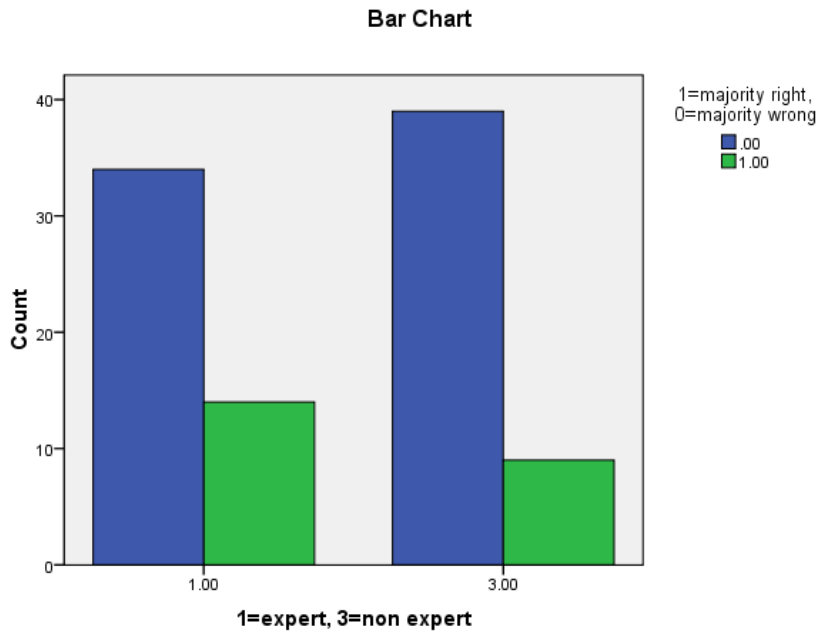
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1.429[a]	1	.232	.339	.170	
Continuity Correction[b]	.915	1	.339			
Likelihood Ratio	1.438	1	.230	.339	.170	
Fisher's Exact Test				.339	.170	
Linear-by-Linear Association	1.415[c]	1	.234	.339	.170	.094
N of Valid Cases	96					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.50.

b. Computed only for a 2x2 table

c. The standardized statistic is -1.189.



Percentage correct answer with 'Result'

Ranks

1=expert, 3=non expert		N	Mean Rank	Sum of Ranks
Perc_right	1.00	24	25.75	618.00
	3.00	24	23.25	558.00
	Total	48		

Test Statistics[a]

	Perc_right
Mann-Whitney U	258.000
Wilcoxon W	558.000
Z	-.619
Asymp. Sig. (2-tailed)	.536
Exact Sig. (2-tailed)	.542
Exact Sig. (1-tailed)	.271
Point Probability	.003

a. Grouping Variable: 1=expert, 2=crowd, 3=non expert

Correct prediction with 'Result'

1=expert, 2=crowd, 3=non expert * 1=majority right, 0=majority wrong Crosstabulation

			1=majority right, 0=majority wrong		
			.00	1.00	Total
1=expert, 2=crowd, 3=non expert	1.00	Count	11	13	24
		Expected Count	13.0	11.0	24.0
		% within 1=expert, 2=crowd, 3=non expert	45.8%	54.2%	100.0%
	3.00	Count	15	9	24
		Expected Count	13.0	11.0	24.0
		% within 1=expert, 2=crowd, 3=non expert	62.5%	37.5%	100.0%
Total		Count	26	22	48
		Expected Count	26.0	22.0	48.0
		% within 1=expert, 2=crowd, 3=non expert	54.2%	45.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1.343[a]	1	.247	.385	.193	
Continuity Correction[b]	.755	1	.385			
Likelihood Ratio	1.349	1	.245	.385	.193	
Fisher's Exact Test				.385	.193	
Linear-by-Linear Association	1.315[c]	1	.252	.385	.193	.119
N of Valid Cases	48					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.00.

b. Computed only for a 2x2 table

c. The standardized statistic is -1.147.

Percentage correct answer with 'Score'

Ranks

1=expert, 2=crowd, 3=non expert		N	Mean Rank	Sum of Ranks
Perc_right	1.00	24	24.71	593.00
	3.00	24	24.29	583.00
	Total	48		

Test Statistics[a]

	Perc_right
Mann-Whitney U	283.000
Wilcoxon W	583.000
Z	-.105
Asymp. Sig. (2-tailed)	.917
Exact Sig. (2-tailed)	.922
Exact Sig. (1-tailed)	.461
Point Probability	.004

a. Grouping Variable: 1=expert, 2=crowd, 3=non expert

Correct prediction with 'Score'

1=expert, 2=crowd, 3=non expert * 1=majority right, 0=majority wrong Crosstabulation

			1=majority right, 0=majority wrong		
			.00	1.00	Total
1=expert, 2=crowd, 3=non expert	1.00	Count	23	1	24
		Expected Count	23.5	.5	24.0
		% within 1=expert, 2=crowd, 3=non expert	95.8%	4.2%	100.0%
	3.00	Count	24	0	24
		Expected Count	23.5	.5	24.0
		% within 1=expert, 2=crowd, 3=non expert	100.0%	.0%	100.0%
Total		Count	47	1	48
		Expected Count	47.0	1.0	48.0
		% within 1=expert, 2=crowd, 3=non expert	97.9%	2.1%	100.0%

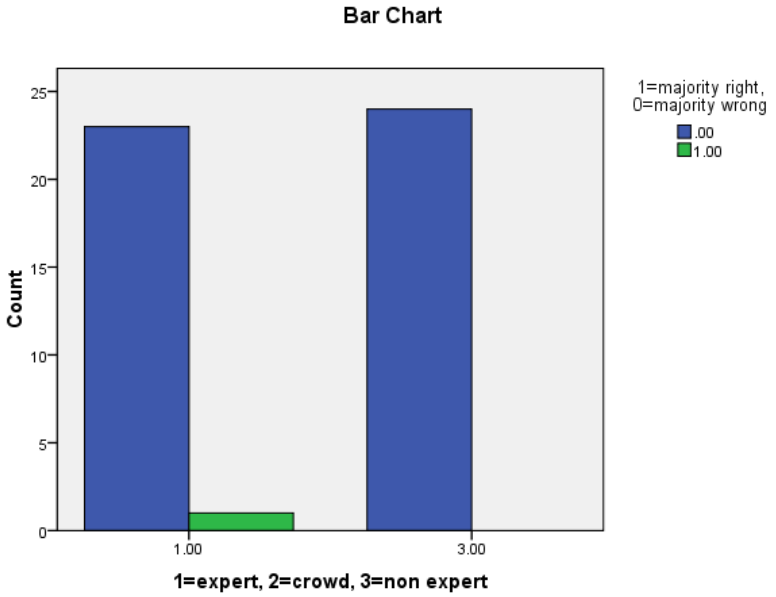
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1.021[a]	1	.312	1.000	.500	
Continuity Correction[b]	.000	1	1.000			
Likelihood Ratio	1.408	1	.235	1.000	.500	
Fisher's Exact Test				1.000	.500	
Linear-by-Linear Association	1.000[c]	1	.317	1.000	.500	.500
N of Valid Cases	48					

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .50.

b. Computed only for a 2x2 table

c. The standardized statistic is -1.000.



D.3 Table of results of obtained data

	Existing statistics 1	Existing statistics 2
Title	EK2008	IEX.nl
Subject	Soccer: European champignonship 2008	Stock market: AEX index
When received	Jun-09	Feb-10
Level 1	Experts	Experts
Level 2	Non-experts	Internet users
How are the experts defined?	Should watch and play soccer > 3 years + more than 1 hour per week	Should make or have made a living in the field
When experiment	Jun-08	December 2001 - June 2009
Where experiment	The Netherlands	The Netherlands
What forecasted (1)?	Outcoming of competitions during the European Champignon ship 2008 of soccer	Prediction tendency AEX-index in one month
What forecasted (2)?	-	Prediction tendency AEX-index in six months
How many predictions	52 predictions	1 month: 92 predictions and 6 months: 86 predictions
Type of questionaire 1	No information (allowed to search)	No information (allowed to search)
Number of participants	50 participants	Variations from 265 untill 2553 with 1 month prediction and 272 untill 2544 with the 6 month prediction
Number level 1	20 participants	Average 1 month: 41, Average 6 months 39
Type of questionnaire	1	1
Mean experience	Watch competitions = 16 years, Play soccer = 14 years	Not known
Number level 2	30 participants	Average 1 month: 771, Average 6 months 765
Type of questionnaire	1	1
Mean experience	N.a.	Not known
Incentives	Pay € 5 to participate, three winner get resp. ((82*5)*60%) €246, ((82*5)*30%) €123 and €41	No incentives
Result (1)	In terms of predicting who wins:The experts in most cases make slighty better, but not significantly better predictions	In terms of one month predictions:The experts in most cases make slighty better, but not significantly better predictions
Result (2)	In terms of predicting the score: Both groups can not predict this very well	In terms of six month predictions:The non-experts in most cases make slighty better, but not significantly better predictions

D.4: Participants EC2008

Nr	Naam	Zelf ingevuld	Tijd spenderen	Wedstrijden volgen	Voetbal spelen	Leeftijd	Opleiding
1	Gert Haveman	Ja	5 - 10 uur	10 - 15 jaar	3 - 6 jaar	25 - 40 jaar	HBO
2	Dravin Ganesh	Ja	3 - 5 uur	> 15 jaar	Niet	25 - 40 jaar	MBO
3	Peter Scheepers	Ja	1 - 3 uur	> 15 jaar	Niet	40 - 55 jaar	WO
4	Bart Ouwehand	Ja	1 - 3 uur	> 15 jaar	Niet	25 - 40 jaar	WO
5	Arno Dries	Ja	5 - 10 uur	> 15 jaar	> 15 jaar	25 - 40 jaar	WO
6	Sabine Erkeland	Ja	0 uur	Niet	Niet	25 - 40 jaar	HBO
7	Erik van Boven	Ja	0 uur	> 15 jaar	Niet	40 - 55 jaar	HBO
8	Marcel Wigmans	Ja	3 - 5 uur	> 15 jaar	> 15 jaar	25 - 40 jaar	WO
9	Sabine Benen	Ja	1 - 3 uur	Niet	Niet	25 - 40 jaar	HBO
10	Jeroen van der Berg	Ja	1 - 3 uur	Niet	Niet	25 - 40 jaar	HBO
11	Hans Lobik	Ja	3 - 5 uur	10 - 15 jaar	10 - 15 jaar	40 - 55 jaar	WO
12	Martin Velgersdijk	Ja	0 uur	Niet	Niet	25 - 40 jaar	HBO
13	Tineke van den Berg	Nee	0 uur	Niet	Niet	40 - 55 jaar	HBO
14	Danny van den Berg	Ja	3 - 5 uur	10 - 15 jaar	6 - 10 jaar	25 - 40 jaar	HBO
15	Margot Roojers	Ja	1 - 3 uur	Niet	Niet	40 - 55 jaar	MBO
16	Erik Wijnen	Ja	0 uur	Niet	Niet	25 - 40 jaar	MBO
17	Rob Jansen	Ja	1 - 3 uur	> 15 jaar	Niet	25 - 40 jaar	HBO
18	Diana Muijt	Ja	0 uur	Niet	Niet	40 - 55 jaar	MBO
19	Jan Verstegen	Ja	1 - 3 uur	> 15 jaar	> 15 jaar	25 - 40 jaar	HBO
20	Danny Mulder	Ja	5 - 10 uur	> 15 jaar	> 15 jaar	25 - 40 jaar	HBO
21	Emiel Diermanse	Ja	3 - 5 uur	> 15 jaar	> 15 jaar	40 - 55 jaar	HBO
22	Andrei Popa	Ja	3 - 5 uur	> 15 jaar	10 - 15 jaar	15 - 25 jaar	MBO
23	Charlotte Schuurmans	Ja	1 - 3 uur	6 - 10 jaar	Niet	40 - 55 jaar	HBO
24	Trudy van der Steen	Gedeeltelijk	0 uur	Niet	Niet	40 - 55 jaar	HBO
25	Ivone Delgado Lopes	Ja	0 uur	Niet	Niet	25 - 40 jaar	HBO
26	Henk Dieters	Ja	1 - 3 uur	> 15 jaar	Niet	40 - 55 jaar	WO
27	Frans de Smet	Ja	1 - 3 uur	Niet	Niet	40 - 55 jaar	HBO
28	Martin Berkhof	Ja	10 - 15 uur	> 15 jaar	10 - 15 jaar	25 - 40 jaar	MBO
29	Paul van der Leer	Ja	1 - 3 uur	> 15 jaar	Niet	25 - 40 jaar	WO
30	Eveline Koolmees	Ja	0 uur	Niet	Niet	25 - 40 jaar	HBO
31	Kris de Leeuw	Ja	3 - 5 uur	3 - 6 jaar	Niet	25 - 40 jaar	WO
32	Erik van Beek	Ja	1 - 3 uur	> 15 jaar	> 15 jaar	40 - 55 jaar	HBO
33	Andries Veenstra	Ja	3 - 5 uur	> 15 jaar	Niet	25 - 40 jaar	HBO
34	Pamela Boef	Gedeeltelijk	1 - 3 uur	6 - 10 jaar	Niet	25 - 40 jaar	HBO
35	Anne van Peperstraten	Ja	3 - 5 uur	10 - 15 jaar	10 - 15 jaar	40 - 55 jaar	MBO
36	Christian Gerth	Ja	1 - 3 uur	> 15 jaar	6 - 10 jaar	25 - 40 jaar	WO
37	Stephanie Los	Ja	5 - 10 uur	10 - 15 jaar	6 - 10 jaar	25 - 40 jaar	HBO
38	Michel Schriek	Ja	1 - 3 uur	> 15 jaar	>15 jaar	40 - 55 jaar	HBO
39	Eugene Nefkens	Ja	1 - 3 uur	> 15 jaar	Niet	25 - 40 jaar	WO
40	Jack de Frankrijker	Ja	1 - 3 uur	> 15 jaar	> 15 jaar	40 - 55 jaar	WO
41	Chiara Faashen	Gedeeltelijk	1 - 3 uur	6 - 10 jaar	Niet	25 - 40 jaar	HBO
42	Jorge Fonseca	Ja	3 - 5 uur	> 15 jaar	> 15 jaar	25 - 40 jaar	HBO
43	Patrick Hoevenaars	Ja	1 - 3 uur	Niet	10 - 15 jaar	25 - 40 jaar	HBO
44	Ralf Bosman	Ja	3 - 5 uur	> 15 jaar	Niet	25 - 40 jaar	WO
45	Frank Boxem						
46	Yuksel Ersoy						
47	Raymond Gelens						
48	Gracita George	Ja	1 - 3 uur	0 - 3 jaar	Niet	25 - 40 jaar	HBO
49	Kees Geuze						
50	Ronald van der Have	Ja	10 - 15 uur	> 15 jaar	> 15 jaar	25 - 40 jaar	HBO
51	Anno Hoekstra						
52	Lia Hoogendijk						
53	Patricia Hout						
54	Erwin Jansen						
55	Ramona van Kesteren	Ja	0 uur	Niet	Niet	25 - 40 jaar	HBO
56	Ilonka Luksen	Ja	0 uur	> 15 jaar	Niet	40 - 55 jaar	MBO
57	Josette Martina						
58	Remco Offers	Ja	1 - 3 uur	> 15 jaar	Niet	25 - 40 jaar	HBO
59	Charles van der Put	Gedeeltelijk	1 - 3 uur	> 15 jaar	> 15 jaar	25 - 40 jaar	HBO
60	Boudy Roelofs- Scholten						
61	Bob Stemerdink						
62	Necla Tarla	Ja	1 - 3 uur	3 - 6 jaar	Niet	25 - 40 jaar	MBO
63	Anikó Tóth						
64	Paula Verbaas						
65	Hans Vermeulen	Ja	3 - 5 jaar	> 15 jaar	Niet	40 - 55 jaar	MBO
66	Nico Vogels						
67	Wouter van der Voordt						
68	Ingrid Vrolijk-Luhrman	Gedeeltelijk	1 - 3 uur	> 15 jaar	Niet	40 - 55 jaar	MBO
69	Remko van de Watering	Ja	1 - 3 uur	10 - 15 jaar	6 - 10 jaar	25 - 40 jaar	HBO

D.5 : Results AEX-index

		Short			Long		
Date	Expert/ Non-expert	Number of part.	Percentage corr. answer	Right/ Wrong	Number of part.	Percentage corr. answer	Right/ Wrong
01-12-2001	1	23	52.17	1	23	4.35	0
01-12-2001	2	594	48.99	1	611	34.21	0
01-01-2002	1	40	5	0	40	12.5	0
01-01-2002	2	931	18.9	0	945	26.77	0
01-02-2002	1	27	22.22	0	27	18.52	0
01-02-2002	2	384	18.75	0	395	25.06	0
01-03-2002	1	27	37.04	1	27	22.22	0
01-03-2002	2	962	40.64	0	984	31	0
01-04-2002	1	30	16.67	0	30	13.33	0
01-04-2002	2	443	15.35	0	464	16.81	0
01-05-2002	1	29	24.14	0	29	17.24	0
01-05-2002	2	658	16.26	0	691	26.63	0
01-06-2002	1	25	32	0	25	8	0
01-06-2002	2	512	21.09	0	530	32.26	0
01-07-2002	1	27	3.7	0	27	3.7	0
01-07-2002	2	297	23.91	0	309	29.77	0
01-08-2002	1	28	64.29	1	28	0	0
01-08-2002	2	1000	51.3	1	1038	35.84	0
01-09-2002	1	30	30	0	30	0	0
01-09-2002	2	611	24.39	0	635	36.85	0
01-10-2002	1	41	56.1	1	41	12.2	0
01-10-2002	2	583	41.17	1	609	58.46	1
01-01-2002	1	42	57.14	1	42	11.9	0
01-11-2002	2	473	45.88	1	484	33.06	0
01-12-2002	1	44	11.36	0	44	18.18	0
01-12-2002	2	777	21.75	0	804	19.53	0
01-01-2003	1	39	23.08	0	39	35.9	0
01-01-2003	2	542	47.05	1	552	31.88	0
01-02-2003	1	37	5.71	0	37	77.14	1
01-02-2003	2	897	39.35	1	929	24.87	0
01-03-2003	1	33	21.21	0	33	66.67	1
01-03-2003	2	541	36.97	0	556	33.45	0
01-04-2003	1	46	28.26	0	46	36.96	0
01-04-2003	2	574	21.08	0	598	15.55	0

01-05-2003	1	33	15.15	0	33	60.61	1
01-05-2003	2	314	27.39	0	323	38.39	1
01-06-2003	1	39	35.9	0	39	58.97	1
01-06-2003	2	483	25.05	0	505	23.96	0
01-07-2003	1	33	36.36	0	33	66.67	1
01-07-2003	2	680	32.65	0	696	28.16	0
01-08-2003	1	31	41.94	1	31	67.74	1
01-08-2003	2	246	46.75	1	260	46.54	1
01-09-2003	1	26	38.46	1	26	50	1
01-09-2003	2	1155	28.31	0	1191	39.38	1
01-10-2003	1	33	60.61	1	33	33.33	0
01-10-2003	2	605	41.98	1	618	16.18	0
01-11-2003	1	28	25	0	28	21.43	0
01-11-2003	2	1380	25	0	1389	20.09	0
01-12-2003	1	30	36.67	0	30	20	0
01-12-2003	2	1212	33	0	1230	25.77	0
01-01-2004	1	57	71.93	1	57	14.04	0
01-01-2004	2	712	34.83	0	725	19.59	0
01-02-2004	1	31	29.03	0	31	16.13	0
01-02-2004	2	521	36.08	0	566	19.43	0
01-03-2004	1	40	12.5	0	40	12.5	0
01-03-2004	2	892	14.24	0	910	11.32	0
01-04-2004	1	44	22.73	0	44	11.36	0
01-04-2004	2	1007	36.74	0	1034	25.15	0
01-05-2004	1	37	13.51	0	37	37.84	0
01-05-2004	2	236	27.12	0	241	25.31	0
01-06-2004	1	37	43.24	1	37	29.73	0
01-06-2004	2	497	35.41	0	507	42.01	1
01-07-2004	1	38	15.79	0	38	57.89	1
01-07-2004	2	416	17.79	0	428	48.6	1
01-08-2004	1	25	20	0	25	32	0
01-08-2004	2	420	23.1	0	436	47.48	1
01-09-2004	1	35	40	1	35	54.29	1
01-09-2004	2	426	29.81	0	436	31.88	0
01-10-2004	1	37	48.65	1	37	32.43	0
01-10-2004	2	284	34.51	0	293	22.87	0
01-11-2004	1	27	70.37	1	27	44.44	1
01-11-2004	2	642	27.26	0	657	31.2	0

01-12-2004	1	42	61.9	1	42	40.48	0
01-12-2004	2	248	33.47	0	252	47.22	1
01-01-2005	1	47	65.96	1	47	48.94	1
01-01-2005	2	635	26.46	0	649	49.15	1
01-02-2005	1	28	42.86	1	28	46.43	1
01-02-2005	2	292	29.45	0	298	26.85	0
01-03-2005	1	30	16.67	0	30	33.33	0
01-03-2005	2	455	20	0	468	53.42	1
01-04-2005	1	27	11.11	0	27	37.04	0
01-04-2005	2	238	27.13	0	245	29.39	0
01-05-2005	1	43	55.81	1	43	53.49	1
01-05-2005	2	370	33.78	0	378	35.19	0
01-06-2005	1	47	42.55	1	47	40.43	1
01-06-2005	2	320	37.19	0	328	42.07	1
01-07-2005	1	35	42.86	1	35	54.29	1
01-07-2005	2	337	34.12	0	351	36.75	0
01-08-2005	1	25	20	0	25	64	1
01-08-2005	2	581	22.38	0	581	36.14	0
01-09-2005	1	46	39.13	1	46	63.04	1
01-09-2005	2	629	39.27	1	627	29.35	0
01-10-2005	1	37	16.22	0	37	67.57	1
01-10-2005	2	401	12.72	0	401	64.59	1
01-11-2005	1	47	57.45	1	47	34.04	0
01-11-2005	2	722	47.65	1	721	26.63	0
01-12-2005	1	41	39.02	1	41	36.59	0
01-12-2005	2	805	47.33	1	803	28.02	0
01-01-2006	1	68	57.35	1	68	33.82	0
01-01-2006	2	1076	49.44	1	1073	27.21	0
01-02-2006	1	37	29.73	0	37	48.65	1
01-02-2006	2	707	36.21	0	704	27.56	0
01-03-2006	1	39	35.9	1	39	38.46	1
01-03-2006	2	696	40.66	1	695	31.37	0
01-04-2006	1	39	28.21	0	39	38.46	1
01-04-2006	2	745	44.3	1	738	34.15	0
01-05-2006	1	36	30.56	0	36	30.56	0
01-05-2006	2	736	19.97	0	734	38.69	1
01-06-2006	1	38	31.58	0	38	68.42	1
01-06-2006	2	432	31.25	0	431	34.8	0

01-07-2006	1	33	48.48	1	33	81.82	1
01-07-2006	2	878	56.38	1	874	55.84	1
01-08-2006	1	33	52.51	1	33	30.3	0
01-08-2006	2	695	47.48	1	694	32.42	0
01-09-2006	1	41	39.02	1	41	34.15	0
01-09-2006	2	799	43.43	1	798	30.7	0
01-10-2006	1	36	27.78	0	36	52.78	1
01-10-2006	2	669	35.87	0	669	53.81	1
01-11-2006	1	47	31.91	0	47	57.45	1
01-11-2006	2	783	18.65	0	783	43.93	1
01-12-2006	1	51	50.98	1	51	56.86	1
01-12-2006	2	923	45.07	1	917	51.69	1
01-01-2007	1	79	15.19	0	79	44.3	1
01-01-2007	2	1075	38.98	0	1072	59.89	1
01-02-2007	1	46	17.39	0	46	36.69	1
01-02-2007	2	1157	17.03	0	1154	45.23	1
01-03-2007	1	40	40	1	40	42.5	1
01-03-2007	2	705	36.74	0	703	25.18	0
01-04-2007	1	38	26.32	0	38	39.47	1
01-04-2007	2	597	25.46	0	591	24.03	0
01-05-2007	1	39	33.33	1	39	28.21	0
01-05-2007	2	1491	42.52	1	1478	38.97	1
01-06-2007	1	41	43.9	1	41	14.63	0
01-06-2007	2	914	44.86	1	913	32.97	0
01-07-2007	1	49	38.78	1	49	26.53	0
01-07-2007	2	999	26.03	0	995	36.78	1
01-08-2007	1	44	25	0	44	11.36	0
01-08-2007	2	651	21.04	0	650	29.69	0
01-09-2007	1	35	34.29	0	35	17.14	0
01-09-2007	2	864	41.78	1	863	33.84	0
01-10-2007	1	49	30.61	0	49	14.29	0
01-10-2007	2	905	36.13	0	902	28.94	0
01-11-2007	1	53	33.96	0	53	30.19	0
01-11-2007	2	646	18.27	0	644	22.52	0
01-12-2007	1	50	16	0	50	26	0
01-12-2007	2	1803	31.28	0	1793	16.12	0
01-01-2008	1	74	24.32	0	74	22.97	0
01-01-2008	2	797	23.34	0	795	26.67	0

01-02-2008	1	47	29.79	0	47	19.15	0
01-02-2008	2	908	30.73	0	906	53.2	1
01-03-2008	1	42	16.67	0	42	16.67	0
01-03-2008	2	1478	31.33	0	1467	44.99	1
01-04-2008	1	53	43.4	1	53	18.87	0
01-04-2008	2	1318	39.83	1	1311	35.24	0
01-05-2008	1	52	40.38	1	52	32.69	0
01-05-2008	2	1457	46.6	1	1455	21.1	0
01-06-2008	1	45	42.22	1	45	33.33	0
01-06-2008	2	822	20.19	0	820	23.05	0
01-07-2008	1	54	31.48	0	54	27.78	0
01-07-2008	2	1191	37.45	1	1181	47.93	1
01-08-2008	1	46	50	1	46	32.61	0
01-08-2008	2	960	45.1	1	957	27.59	0
01-09-2008	1	43	13.95	0	43	23.26	0
01-09-2008	2	721	17.48	0	720	19.31	0
01-10-2008	1	52	30.77	0	52	21.15	0
01-10-2008	2	1413	26.96	0	1405	34.8	0
01-11-2008	1	63	17.46	0	63	15.87	0
01-11-2008	2	2490	22.69	0	2481	16.65	0
01-12-2008	1	53	15.09	0	53	20.75	0
01-12-2008	2	1007	34.16	0	1004	22.71	0
01-01-2009	1	90	16.67	0			
01-01-2009	2	899	35.71	0			
01-02-2009	1	60	31.67	0			
01-02-2009	2	820	33.54	0			
01-03-2009	1	53	30.19	0			
01-03-2009	2	690	33.48	0			
01-04-2009	1	75	57.33	1			
01-04-2009	2	812	50.12	1			
01-05-2009	1	60	51.67	1			
01-05-2009	2	461	54.88	1			
01-06-2009	1	61	22.95	0			
01-06-2009	2	943	25.66	0			