Visual Agency

TECHNO-ANTHROPOLOGY – MASTER'S THESIS

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ABSTRACT

This project seeks to examine the practice of forecasting based on data visualizations and visual analyses, by tracking user activity, within an online thread, where people gather from all around the world to discuss and share ideas and visual forecasts. The availability and application of data visualizations is increasingly becoming a de facto way of operating processes and empowering decision makers. Readiness of swiftly accessible and scalable data visualizations is becoming a synonymous for informed management and symbolic to modern ways of running commercial businesses. Accordingly, the aim of this project is to study data visualization and forecasting as a practical activity, that encompasses and depends on utilization of socio-material conditions and elements. In order to achieve this, I will be following how forecasting is being expressed and performed through data visualizations.

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INTRODUCTION

This project seeks to examine the practice of forecasting based on data visualizations and visual analyses. In contemporary commercial environments, it is becoming increasingly common to deploy visual material and tools, such as graphs and charts, to ease and support decision-making processes. With that in mind, I decided to initiate a research in a field where data visualizations and forecasting are indispensably tied together. This study is conducted by tracking, and collecting qualitative and quantitative data, from an online community where people dedicates themselves to analyze and forecast the price of the Euro-Dollar currency cross, primarily by deploying visual materials, methods, indicators and tools. By tracking user activity, within an online thread, where people gather from all around the world to discuss and share ideas and forecasts, I was hoping to gain knowledge of the practical aspects of conducting visual analyses and forecasting. Within a field where participants are exceedingly engaged in the practice of visualization and forecasting, my expectation was to achieve a nuanced picture of significant aspects, which hopefully can be generalized to other fields as well.

The availability and application of data visualizations is increasingly becoming a de facto way of operating processes and empowering decision makers. Readiness of swiftly accessible and scalable data visualizations is almost becoming a synonymous for informed management and symbolic to modern ways of running commercial businesses. This trend can indeed be linked to the advance in technology, which have resulted in massive explosions of new types of analytical self-service platforms and tools that reaches far beyond simple Excel sheets and basic visualizations. While heading towards a new era of data availability and accessibility of tools that can handle and visualize this growing pool of data, I believe we all can benefit from critical assessments of practices related to data visualization. With this project, my intention is increasing attention towards the differences between making well shaped and appealing data visualizations, and consequently using these visualizations for practical purposes. This type of research will hopefully contribute to a gradual encouragement of self-awareness and critical distance when facing visual materials and actions justified by this material.

This research did take place in an online forum where people mainly gather to follow, discuss and share analyses, tools, forecasts and several other relevant issues significant to foreign exchange

trading, also known as forex trading. The website is named forexfactory.com and consists of numerous tools, news sections, and threads associated to specific topics and currencies. I am explicitly following the activity in a thread named "EUR/USD Only". As the name implies, the only discussed financial asset inside this thread is the Euro-Dollar currency cross. EUR/USD is simply a measure of how many Dollars a single Euro is worth. The participants within this thread uses all kinds of visual tools, indicators and analytical methods to anticipate and forecast the price development of this currency pair. They are mainly interested in daily to weekly price movements, and tend to stick to smaller timeframes, ranging between minutely and daily time frames. The application of visualized data and visual analytical techniques utilized to determine, share and forecast certain price changes is almost all that matters. Therefore, it is very common to encounter several images attached to posts in the thread. Below is a screen shot that shows the format of the thread.
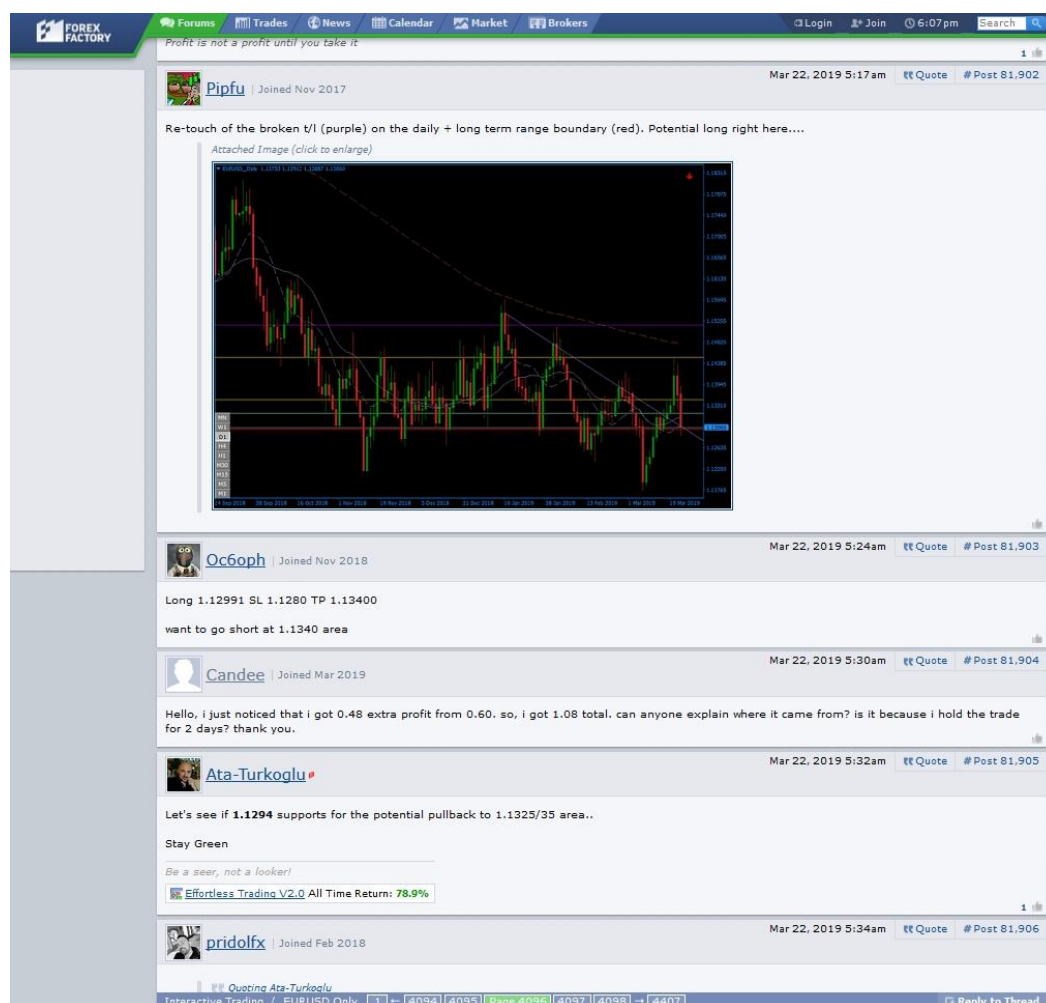
PROBLEM STATEMENT

Data visualizations are being utilized as key persuasive tools to implement decisive actions, and drawing important decisions and conclusions. Subjective acts, such as estimating and forecasting, are activities where visualizations often get involved. When reading news papers or watching television, average persons as well are often subject to similar graphical content and estimations.

However, we actually do not know- and care much about the consequences of exposing ourselves or others to data visualizations. Instead of caring about the practical processes encompassing visualizations, we care much more about their technical properties such as how informative, coherent and attractive they are.

Accordingly, the aim of this project is to study data visualization and forecasting as a practical activity, that encompasses and depends on utilization of socio-material conditions and elements. In order to achieve this, I will be following how forecasting is being expressed and performed through data visualizations. I will try to clarify this issue by answering following points:

- How are data visualizations utilized in practice during moments of forecasting?
- What impacts does data visualizations have on forecasting and vice versa?

THEORY

ANT

Throughout this project, I have adopted the theoretical approach of ANT (Actor-network-theory). ANT is a constructivist theory portraying and explaining natural and social phenomena based on the construction of micro- and macro actors. This conception of an "actor" should not be confused with the notion that macro actors are superior to micro actors given phycological, economical, or material preeminence. In contrast, ANT would never place the actors within predefined categories, which provides them specific features, prior to the analysis.

The intention behind this particular philosophy is to prevent overlooking underlying power relations that contains the true story about how the difference in power came to be in the first place, and not about denying that there is an actual difference in levels power. To better achieve this in practice, we must think of actors and networks as two sides of the same coin. This simply implies that actors at the very same time are networks as well. We can think of it such that, one actor's network space might be limited to a small area, while another one can be stretched all over the place (Callon & Latour, 1981, p. 280). By investigating difference in power in such a way, it becomes possible to add heterogeneity to the issue at stake.

ANT is about removing all kinds of bolts and screws that make a certain order appear essential and undeniable. When dealing with science and technology, we should thus treat it as a practical activity, performed within a community, rather than describing it as a logical or cognitive accomplishment. The actual mystery is how researchers for instance can induce a scientific fact by using rats and chemicals. To get closer to explaining this, the researcher can benefit from shifting attention towards the wide range of instruments in the lab (Latour & Woolgar, 1986). In order to diminish sharp dichotomies such as actors-network, nature-culture and human-non-human, ANT advocates for the notion of generalized symmetry. The researcher must disclaim, the notion of who or what is acting in a given situation. The symmetry does not mean that human beings and technologies are alike, but should rather be considered as a methodical measure to avoid analytical presumptions (Jensen C. B., 2015, p. 410). This implies that objects, as well as humans, should be examined for agency. Objects should not have a restricted role in social sciences. Materials and technologies must

be given freedom of movement and influence so that the scope of agency can be extended beyond human actors (Latour, 2005, pp. 76-77).

The researcher should not move between categories such as micro and macro or online and offline, because these sites and levels do not exist in their pure form anymore. Following a flat two-dimensional ontology suggests the need to avoid the third dimension, which entails the predefined categories (Latour, 2005, s. 171-172). In short, there is nothing but actors and their joint associations. The researcher therefore must keep the landscape flat. Actors should not be ascribed invisible phenomena that cannot be associated with their own actions. Invisible agent that do not change anything, produce transformation, and enter the accounts should be avoided (Latour, 2005, p. 53).

LITERARY INSCRIPTIONS AND INSCRIPTION DEVICES

Apparatuses and devices are ascribed an important role in ANT analyses. By default, it is possible to distinguish between two types of devices. One which transform matter between one state to another, and by contrast, a number of other devices, which we shall call "inscription devices" that transform pieces of matter into written documents (Latour & Woolgar, 1986, p. 51). With these transformations, a bridge is formed between practical and material processes on one side- and the phenomena and objects that analysts speak of on the other. The products of this process are referred to as "literary inscriptions", and are obtained by means of special instruments or "inscription devices" (Blok & Jensen, 2011, p. 31). Inscription devices contains commonly accepted knowledge from other scientific fields. One should therefore study an instrument based on several possible functions, or roles, as it can be included in different contexts where different material is produced. It is the task of the researcher to identify where and when apparatuses contribute to producing different types of inscriptions (Olsen & Kroustrup, 2007, p. 69).

Inscription devices are able to produce inscriptions that are directly applicable arguments. A consequence of this perception is that inscriptions are considered to have a direct relation to the original incident. The final inscription, which might be a diagram or curve, is then central to the discussion of the properties of the incident. Prior material activity and all aspects of what is often, a long and costly process are fixed in discussions about what the figure means. The process of writing

articles on the substance, thus, takes the final diagram as the starting point (Latour & Woolgar, 1986, p. 51).

A myriad of discussions is solved by throwing a graph, or a paper filled with figures on the table. Technological innovations have made it possible to establish more sustainable links between inscriptions and phenomena. Inscriptions have become a medium, so that statements can spread to many others, thereby accelerate the power and scope of a statement. This would, of course, increase the authority of a specific inscription simply because it could bring together more allies (Blok & Jensen, 2011, p. 43).

Inscriptions are convenient solutions to rhetorical problems. Without having to move, we are able to refer to text and figures that connects distant elements as if we had established some form of two-way connection. Latour believes that this mechanism should not be underestimated as we can hardly imagine what to know without indexes, references and tables (Latour, 1986, p. 13). However, without standardized measurement of units, it would be incompetent to construct credible inscriptions. This is where "metrology" come into play. Metrology is the scientific organization of stable measurements, units and standards. It is not just a question of setting precise definitions, but involves the materialization of these definitions, in a network of instruments as well. Otherwise, no measurement would be stable enough to allow the homogeneity of the inscriptions and their return (p. 28). Metrology is also what has generated a stream of credible inscriptions, which are "immutable and combinable mobiles". Immutability implies that inscription do not change in shape and preserve the representation of an object. Mobility emphasizes that they can be transported from one situation- or location to the another. The combination, of immutability and mobility, enables the generation of second-order inscriptions by juxtaposing, comparing or superimposing the inscriptions. Through these manipulations, one might generate spectacular new representations of phenomena such as the movement of a galaxy, or changes in gross domestic product (Jensen T. E., 2008, p. 34).

The following points highlights the benefits of immutable and combinable inscriptions (Latour, 1986, pp. 19-20):

1) They are mobile and can be moved from place to place or, if necessary, from context to context.

2) They are immutable and retain their shape when they are moving. In the worst case, to achieve this result, hard work is being done.

3) They are flat, which allows them to be dominated. The flat structure allows the exercise of a form of expertise.

4) They can vary in scale and be modified as needed. Billions of galaxies are no greater than they can be counted as nanochromosomes.

5) They can be produced, reproduced and distributed at very low costs and very great numbers.

6) Thanks to their optical consistency, inscriptions can be combined or separated just as needed.

7) Another effect this combinability is that inscription can be superimposed. Most of what we know as structure, patterns, theory and abstraction, in contemporary sciences, is a consequence of this.

8) Inscriptions can be summarized with text and the text can refer to the contents of the inscription. Inscriptions from different devices can also be summarized with already existing text.

9) The most important according to Latour is their two-dimensional character, which allows inscriptions to be summarized with geometry. This has resulted in allowing us working on paper, with goals and figures, and manipulating physically unreachable three-dimensional objects "out there".

TRANSLATION

Inscriptions and translations go hand in hand. Literary inscriptions transform substances into text. People, texts, objects, substances, and what else must be in the network, are all subject to continuous translation processes. Inscriptions are thus a result of a series of transformations. Translation is a general process in ANT, whereby the identity of the actor, the possible forms of interaction, and the scope of the action is negotiated and defined (Olsen & Kroustrup, 2007, p. 77). Translation is necessary because objects resist - and it is possible because a network consists of heterogeneous objects that themselves consist and are formed by other objects. Any translation is a kind of partial reduction or abstraction, which means that every stage extracts elements from a sub-stage, to gather as many resources as possible at one place (Miller, 2013, pp. 59-60). Material objects allow actors to build hierarchies and associations that lasts better than concrete human

interactions. It thus makes sense to question what kind of material translations contributes to the stability of a network.

METHODS

During my exploration of the field, I applied a combination of qualitative and quantitative- methods and research strategies. When combining methods, what matters is not the purpose of the research, but rather how the purpose should be achieved. The reason could be a desire to reach more secure knowledge, more comprehensive knowledge, more complementary knowledge, or more complex knowledge (Frederiksen, 2015, p. 200).

My main strategy for this research is online ethnographic fieldwork. Fieldwork can however be an unclear category, because it can both entail a range of interventionist and non-interventionist elements. In general, performing fieldwork implies being present, physically or virtually, and producing knowledge through this presence (p. 200). The data can for instance be collected through observations or interviews, but what actually matters is the ability to have attained data, in form of particular instances, which then can be followed upon and further examined, by drilling in, due to its qualitative properties. In theory, this is great, but in practice, there is also a chance of ending with a narrow and limited product, because qualitative theories are characterized by stringent epistemic criteria shaped through philosophical world views and research agenda, which all provides certain perquisites and qualities, but limitations as well.

The general instruction of ANT is to follow the actor, but this strategy have also received serious criticism for its interest in powerful actors, and lack of interest in weak actors (Clarke & Montini, 1993). In such cases, rather than considering whether it is right to focus on strong or weak actors, I believe it is more productive to care about, whether such a constraint would make a huge impact on the results of the study, and moreover, what is ideally possible to achieve in the field, where the study is being performed.

I believe it is more suitable to admit that any qualitative strategy or method can have its limitations, and think of alternative ways that can contribute to make the research field more transparent. I was sure that a certain degree of complementarity and transparence could be achieved by supplementing my research with quantitative information about the field in which the research took place. When following this path, the final product does not necessarily have to aim for a combination of methods that should confirm or contradict each other- they can be combined for explorative aims as well (Frederiksen, 2015, p. 201). For instance, this is achievable by embedding quantitative

methods, into the research design, as a supplement to the main method, which is characterized by a qualitative approach (p. 204). The study may generally apply a qualitative method, where the quantitative part will serve as a minor supplementary study to achieve a more holistic understanding of the field.

With previous thoughts in my mind, I also quantified the field by including a certain amount of explorative data analysis of the landscape. This was achievable due to the fact that I was doing research in an online environment, where I could collect quantitative data in organized fashion.

QUANTITATIVE DATA COLLECTION

Prior to designing my research strategy, I did some lurking within the thread that I was going to examine. I carefully jotted down potentially interesting elements and possible limitations that I was likely to confront during data- collection and analysis. First and foremost, I focused on what data that was possible to collect in a systematic manner. I was looking out for both qualitative and quantitative relevance of the potential data. It was straightforward to point out a list of quantitatively relevant fields for this study. My main criteria for this part was that, information should be visible in- and collectible directly from the "EURUSD only" thread itself. I wanted to limit myself to the thread, where discussions happened, because otherwise the task of automating data collection would become overly complicated. Limiting myself to the thread made it possible to collect all data by developing a modest enough web scraping application. Web scraping is done by scripting applications that interacts with raw HTML content that lies behind web pages. To achieve this task, I first had to make an overview of binary, categorical and continuous variables I found interesting for qualitative inquiry. Next figure demonstrates an instance of a message that highlights what parts of the records, I decided to collect.

The most obvious variables for each message was indeed, date, id, name, content of the message, status (member impact), likes, number of images, and whether the message was quoting another message. Afterwards, I went on to quantify the fields. This data was used for exploring the activity that was going on in the thread during the period of my research. The purpose was gaining a broader insight into what kind of groups that were present, and how actively these groups tended to contribute to thread. This information would be very hard to achieve by manually going through thousands of records and pages, but developing a web scraping tool in order to automate the task, made it quite simple to achieve. This tool was able to loop through each page, within the specified period, and collect data from each record, in raw HTML format.

QUALITATIVE DATA COLLECTION

When collecting the qualitative data, I both followed the conversations in real time, but also back in time. The ability to track activity and records back in time was a clear advantage of performing research in an online environment. Moreover, it was not only possible to track the conversations, but also all the visualizations, and other types of media, published by the members.

In this research project, I was less interested understanding the dynamics and power relations between the members themselves, and more concerned about the visualizations that they were

publishing. From the very beginning, I had in mind that I was going to follow the inscriptions. To be more precise, my intention was to follow and understand the practice of forecasting through data visualizations. This implied following the relationship between the members and their own inscriptions, which also was exactly what I did. I was paying attention to how the members did transform their visualizations and laying emphasis on what effects these transformations had on their forecasts.

There are different approaches to conduct qualitative research in online environments. I adopted a method known as netnography. Like other types of online ethnographical approaches, netnography usually collects online data from publicly available platforms and services. Generally speaking, in contrast to conventional ethnography, netnographies are significantly less time consuming due to fewer practical constraints that a researcher would face in relation to the physical field (Kozinets, 2010, p. 56).

Within the method of netnography, there is an important distinction between studying "online communities" and "communities online". Roughly speaking, it is possible to distinguish between three types of (n)etnographies. Pure ethnography, blended ethnography and pure netnography (p. 67):

- Pure ethnography studies communities or cultures in physical settings. There are basically no important online elements here. The data is characterized by face-to-face cultural interaction.
- Blended ethnography studies communities or cultures online. There are some important online elements when dealing with such groups. Both online and face-to-face interaction matters.
- Pure netnography studies online communities or cultures. Regarding this group, there are no important in-person elements. In this section the study is limited entirely to online interaction and data collection.
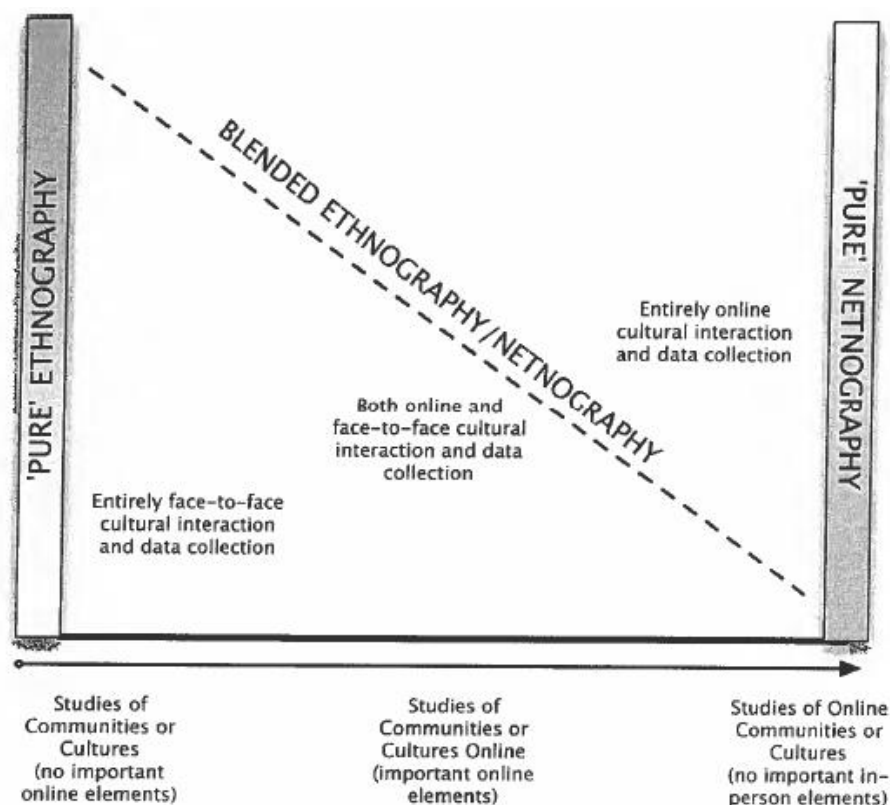
When initiating netnographies, some practical constraints are good to consider in advance. E.g., Is there a direct relation between behaviors online and in face-to-face social situations, or are they different, separate behaviors? The importance of repeated observation of physical activity rather than verbally articulated behaviors, and whether there are rich online representations like images. Whether the performances of the actions captured and recorded in the online environment is sufficient for the generation of theory (p. 66).

I am dealing with an almost purely online community and practice where interaction and flow of information happens in an online setting. There would without any doubts be some relevant information to add from face-to-face interaction as well, but what matters for me, the data visualizations and forecasts, are easily accessible in online format. When dealing with such a research topic, one also has to consider whether people being observed are using authentic identities, their distance regarding geographical locations, and constraints regarding limited time frames. By evaluating the situation and considering this list of relevant factors, I believed it would be fair to limit this research to pure netnography.

In order to adapt conventional face-to-face interview to an online context, following four distinctions can be made. Alteration, anonymity, accessibility and archiving (pp. 68-72)

- Alteration simply means that the nature of interaction is altered. It is both limited and emancipated by the unusual character and rules of technological mediation.
- Anonymity means that no one really have to use their true identities while interacting with others.
- Accessibility indicates that online environments are more or less open to all types of people.
- Archiving is the automated collection of data without any specific personal effort. This is definitely a great advantage of performing online research, because not many details will elude analysis.

ANALYSIS

DATA VISUALIZATION

In contemporary commercial environments, it is a very common exercise to turn to all types of data visualizations, before judging the status quo, or justifying deployment of certain measures and actions. In some professions it is an indispensable and standard procedure, while in others it is limited to be applied as a tool to bring the audience to a common ground, or to effectively direct their attentions towards an issue. Consider following as an example. The data is the same, however, on right side it is represented as a data table, and to the left, as a visual graph. There is no doubt of which one delivers an efficient message and makes immediate impact.

| Date	Open	High	Low	Close
2014.05.18	136.978	137.337	136.155	136.280
2014.05.25	136.246	136.681	135.858	136.339
2014.06.01	136.304	136.769	135.028	136.423
2014.06.08	136.458	136.685	135.121	135.379
2014.06.15	135.373	136.433	135.129	135.995
2014.06.22	135.949	136.510	135.738	136.488
2014.06.29	136.450	136.991	135.851	135.944
2014.07.06	135.935	136.506	135.758	136.032
2014.07.13	136.055	136.401	134.908	135.203
2014.07.20	135.268	135.484	134.210	134.288
2014.07.27	134.305	134.446	133.665	134.264
2014.08.03	134.271	134.323	133.327	134.094
2014.08.10	134.061	134.148	133.356	133.975
2014.08.17	133.913	133.988	132.204	132.381
2014.08.24	131.914	132.204	131.323	131.323
2014.08.31	131.292	131.600	129.201	129.510
2014.09.07	129.531	129.791	128.594	129.643
2014.09.14	129.679	129.951	128.275	128.284
2014.09.21	128.267	129.012	126.769	126.825
2014.09.28	126.812	127.149	125.006	125.145
2014.10.05	125.132	127.914	125.089	126.272
2014.10.12	126.273	128.868	126.248	127.591
2014.10.19	127.552	128.397	126.134	126.681
2014.10.26	126.751	127.701	124.851	125.231
2014.11.02	125.085	125.772	123.571	124.535
2014.11.09	124.637	125.462	123.939	125.215
2014.11.16	125.204	125.991	123.747	123.892
2014.11.23	123.623	125.310	123.623	124.498
2014.11.30	124.613	125.062	122.707	122.844
2014.12.07	122.828	124.949	122.472	124.600
2014.12.14	124.731	125.696	122.200	122.224
2014.12.21	122.230	122.723	121.644	121.773
2014.12.28	121.807	122.209	119.997	120.014
2015.01.04	119.454	119.757	117.536	118.402
2015.01.11	118.481	118.702	114.594	115.650
2015.01.18	115.524	116.790	111.145	112.032

In practices where expressing information and concerns through data visualizations is a common procedure, visualizations are not necessarily proposed to make dramatic impact on the course of events, or to disrupt the way ordinary collective practices are performed. In contrast, they are much more likely to be applied as tools that maintains power relations between hierarchies and preserve the ongoing workflow, exchange of information and maintain channels of communication between actors. When embedded profoundly into a network, they tend to operate as materials that translates a series of negotiations, by reducing them, into a single inscription that can serve as a mediator in a broader network. The inscription replaces otherwise necessary steps of social actions such as calculating, estimating, interpreting, projecting and the burden of verbally expressing all these steps to others.

Practices performed based on data visualization varies dramatically, depending on who the practitioner is and what the specific objectives are. The practitioners might have a pure operational background and corresponding intentions, like, for instance, maximizing savings, minimizing costs, or optimizing production. In this case the objective is, more or less, to move between one state another desirable state, by adjusting essentially controllable parameters. However, in other occasions, the practitioners and objectives might differ considerably. While the way of handling, preparing and representing data do not necessarily have to vary much, the practice performed can have different implications and expectations.

Unlike operational objectives, tasks that requires forecasting and projections into the future would naturally be of different character. When making a forecast, it is very likely that you are doing so because it makes sense and provides an edge. In some cases, it might be the only chance, because it is simply not possible to achieve profitability or success by modifying controllable parameters since they don't have any direct impact on the field that you are involved in

THE EUR/USD CROSS

By default, EURUSD and other types of tradeable forex assets are subject to normal distribution. On following figures, I have highlighted the distribution of price levels, and difference between open and close price by candle, throughout the period I was following the thread.
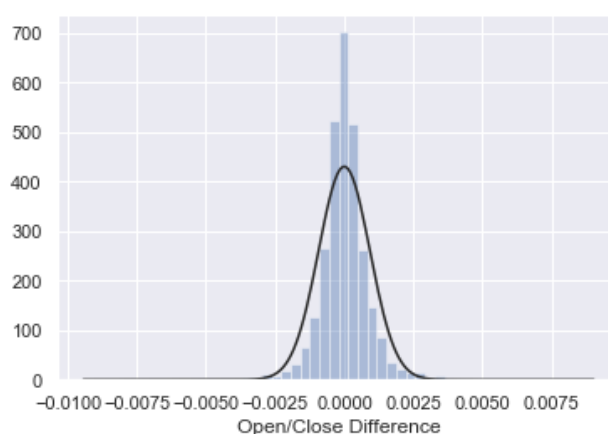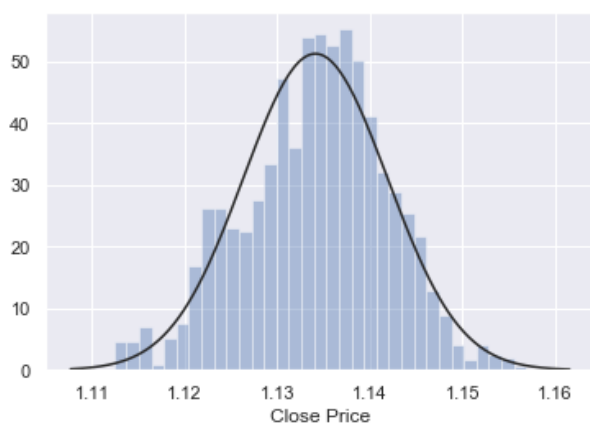
The figures indicate that, theoretically, the price has equal chance to move towards both ends, and approximately within same distance as well. This also implies that the price itself is not really a good indicator of in which direction- or how far the market is heading.

Active members of the thread are usually aware of when influential financial figures, like Non-farm payrolls and GDP, are scheduled to be released. They also keep track other types of events such as the Brexit process. However, impactful information is released rarely, and the reality is that the forecasts are hardly ever based on any other information than the price itself. Indeed, the members do not decide upon raw price information from a data table, but they use a translated version of this data, that is represented as a line graph, or much more often candlestick graph, that contains OHLC information (open, high, low, close):
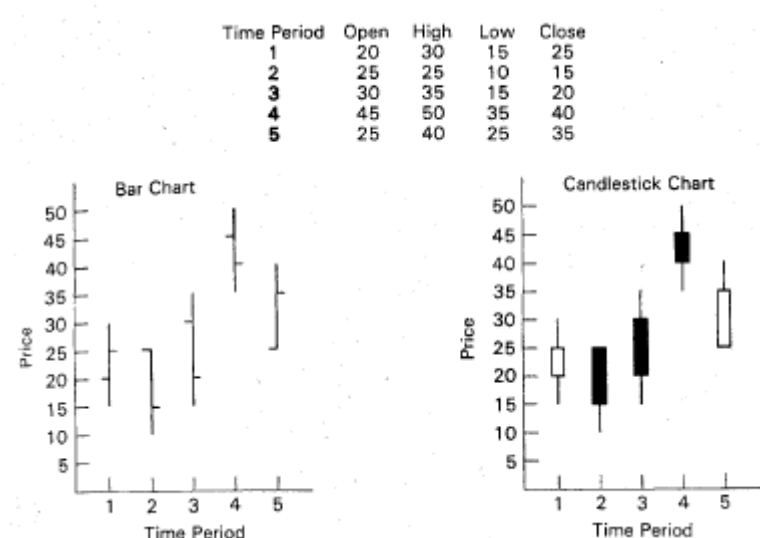
(Nisson, 1991, s. 23)

The translation process does not end at this point. All other indicators that are present on the charts, like for instance moving averages, are as well a result of a series of translation processes. The different components of the chart can seem very dissimilar from each other, but that does not change the fact that they are deriving from the very same source: the price itself.

THREAD ACTIVITY

I have collected the quantitative data, from the thread myself. This process required custom intervention and a certain level of personal effort. I used a method called web scraping, to access raw HTML data from the thread and collect all records. This dataset originally contained 27.800 messages, and covered following information: date, name, id, quoted post, number of likes, and number of images.

uid	name	status	quoted	like	image	date
11825005	digger1	High Impact Member (top 1%)	11824909	4	1	Dec 26, 2018 8:55pm
11825015	wealthyqueen	NaN	11825005	1	0	Dec 26, 2018 9:02pm
11825024	digger1	High Impact Member (top 1%)	11825015	5	0	Dec 26, 2018 9:08pm
11825033	wealthyqueen	NaN	11825024	2	0	Dec 26, 2018 9:15pm
11825044	Pip Bond	NaN	11824982		0	Dec 26, 2018 9:24pm
11825045	Starcraftmaz	Low Impact Member (top 10%)	NaN	1	0	Dec 26, 2018 9:25pm
11825061	Pip Bond	NaN	11825045		0	Dec 26, 2018 9:35pm
11825090	Dingoman-two	High Impact Member (top 2%)	NaN	1	0	Dec 26, 2018 9:59pm

From this point forward, it became possible to observe and analyze information like, how many images and likes the records contained, and the distribution of specific user types as well. It subsequently became possible to compare the thread activity to actual price activity.

The thread that I was investigating, was an interesting subject, because there was an intense flow of inscriptions available for study. The ongoing analytical practice and related communication was almost exclusively dependent on the flow of information that happened through the circulation of data visualizations. Moreover, the ongoing action was not just available for observation in real-time, but also chronologically, where it was possible to travel back and forth in time from a specific point that was relevant for research. Nevertheless, I had to limit myself to a specific period, and preferred not exceed too far behind- or beyond the initial- and closing stages of my research project.

As mentioned already, the use of data visualizations is a very common and natural way of contributing to the thread activity. Of all records, below bar chart highlights the amount that

contains at least one visual graph. By looking at below figure it can be estimated that 6634 records contain images, which is equal to nearly every fourth record.
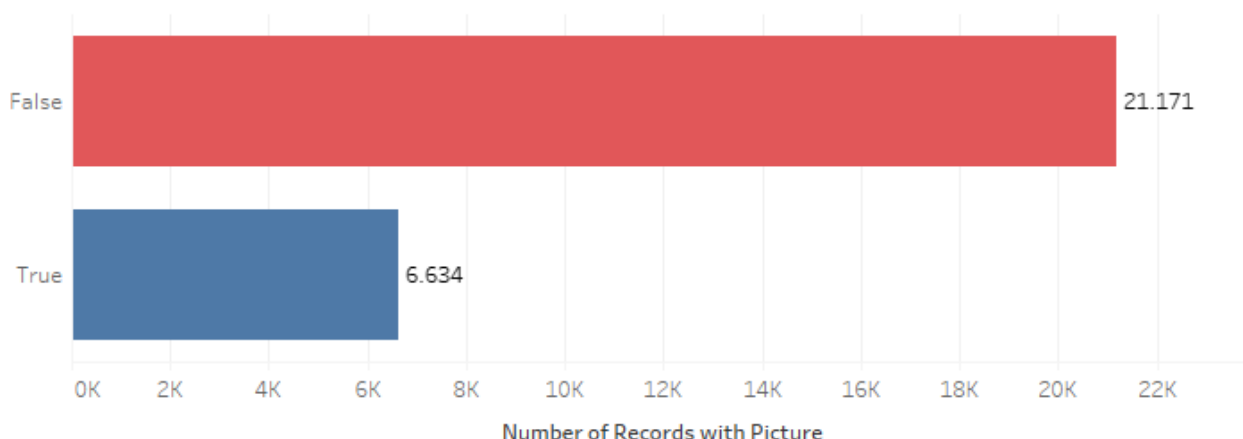

The members of forexfactory.com increase in rank as they gain more subscribers. Most of the records was provided by "high impact" members, and "no impacts" members. No impact simply means that those users have yet not increased in rank at all. In next figure, it is possible to observe how many records there are by each group of members. Another thing that can be seen is how often records belonging to each group includes images.
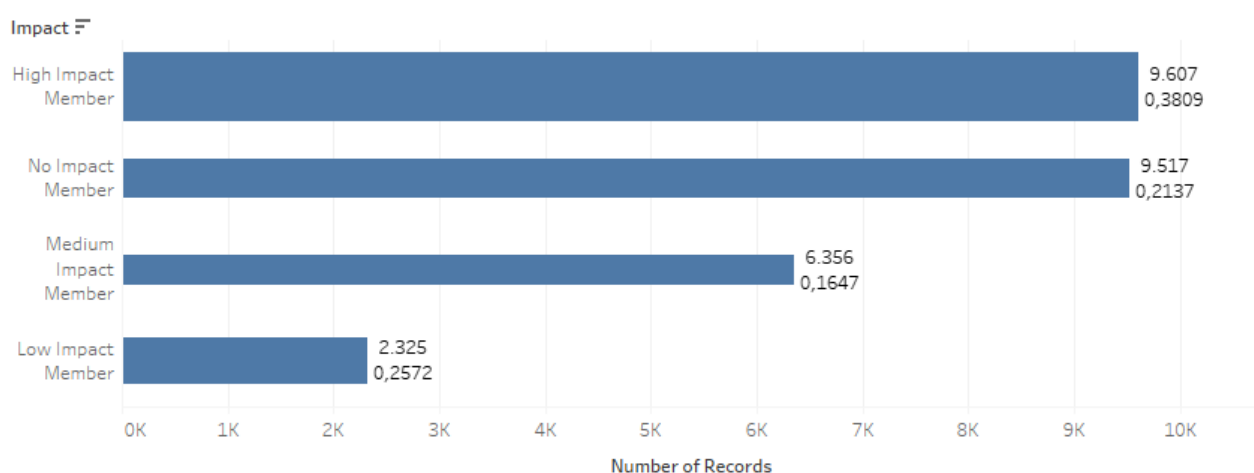

It can be observed that high impact members did provide at least one image on 38% of the records, which indicates that they are the leading providers of data visualizations. With 16.5%, the group that has provided least data visualizations are medium impact members. The difference between rate of visualizations can also be observed by the difference between the thickness of each bar.

Besides being the most active providers of visualizations, high impact members are also the ones receiving most likes for their comments. The distribution of likes, between the members, is allocated very much in accordance to their level of impact. The high impact members have topped the list, by receiving almost 2.4 likes per comment, while no impact members are at the bottom with a rate slightly higher than 1.4 likes per record.
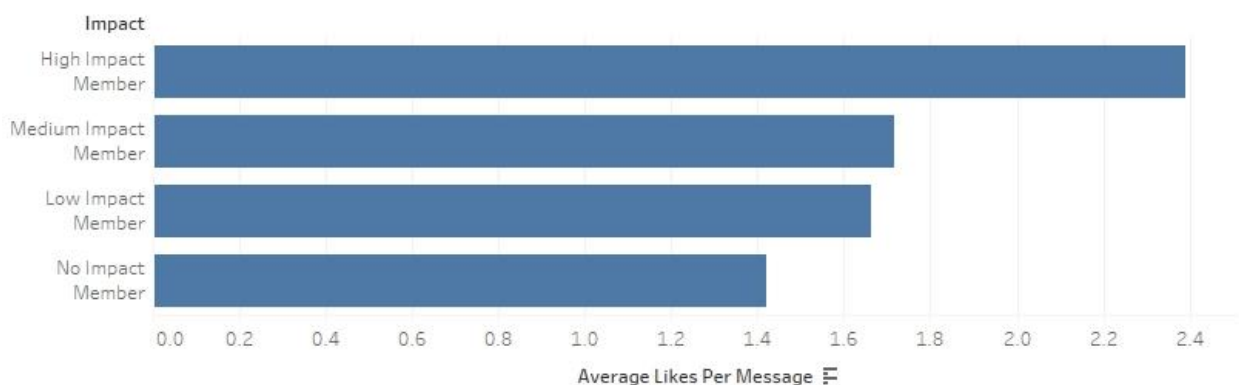
Finally, even though I had collected nearly 27.800 records during this period, there was only a total of 974 unique members contributing the thread. What is remarking is that high impact members, which produces the highest volume of records in the thread, is only represented by a total of 72 unique members. No impact member, which produces nearly the same amount of volume is however represented by a total of 747 members.
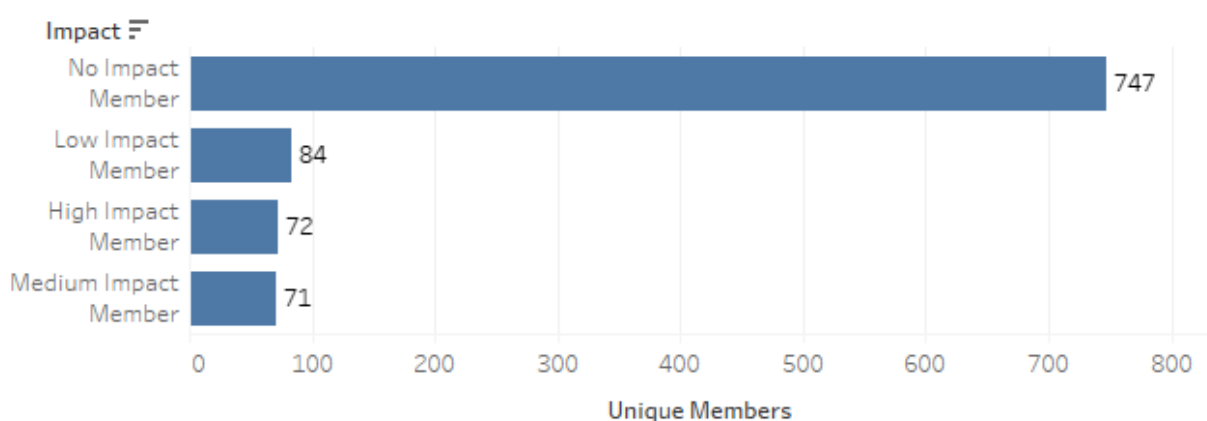
FOLLOWING THE INSCRIPTIONS

During my research I could not avoid noticing one very important distinction. I realized that producing proper data visualizations and making proper predictions based on them are two very

different practices. The practitioner indeed tries to make the visualization as eye-appealing as possible. Despite how well the visualization looks, it is conceivably sometimes nothing beyond an illusion of order that never existed in first place. Several times, I have seen perfectly symmetrical and appealing visualizations followed by mistaken forecasts. Making wrong forecasts usually goes by unnoticed by other members. Neither do correct forecasts constantly get a lot of attention, except from the forecaster himself. The usage of colorful indicators and nice and symmetrical drawings of lines still indicates the importance of appearance. It looks as though there is a balance one needs to follow. Without exceeding a certain level of absurdity, it is very common to add a few indicators below the graph and on top of the price movement. However, when it comes the part of predicting the price, you rarely see that much of a reference to any of these very nice looking and colorful indicators. If one is lucky, the contributor will mention a relation between just a single indicator and the actual prediction that is being made. That leaves one wondering whether these indicators are intended to make more precise prediction, or in order to make the graph look more professional, systematic, and appealing to the public, or the analyst himself. Consider following combinations of charts and predictions for yourself.

In this example the graph is literally covered in all types of indicators, but the forecast is made based on price breaking a manually added triangle.

In next example, we again see a price chart fully surrounded by diverse indicators. However, the contributor simply justifies his projection by referring to a single candle and a triangle that is manually drawn on the chart.

Due to the interesting fact, that there is no serious synchronization between the visual indicators and predictions being published, I decided to track individuals back and forth in hope of reaching additional clues about how they relate their predictions to indicators present on their visualizations. Nevertheless, it turned out that they rarely refer to their indicators when throwing forth a prediction. On a great deal of the instances they do not even refer to a single one of them, which was a bit shocking to be honest. What was surprising me even further, was the continuous change of indicators on the visuals by some members. Following same actors back in time, I realized that sometimes the number of indicators were increased, other times decreased to a single one. On some instances two of them were replaced with other types of indicators, on other instances even

the colors of the charts were totally altered along with the indicators themselves. But what almost always stayed the same was the lack of reasoning based on present indicators. To me it seemed like a hunt of perfection. Maybe a after the 'perfect' eco-system of indicators and a set of laws or theories that flawlessly can be ascribed to this eco-system. This harmony between indicators, the theory and the predictions that derives from them should ideally be working in a successful way most of the time, and if possible, all the time. Following four price graphs do all belong to the same member. Notice how not only the indicators, but the colors as well is different in each visualization.

Taking into consideration the fact that prediction do not necessarily have much to do with the indicators, then if a casual relation exists, between predictions and the course of events, it must be

depending on some other subjective matters. In such a fast-moving environment, the cause-effect mechanism is very likely neither fully clear or visible to the trader himself. I doubt that the practitioners even bother to reason, why they really act the way they do. With this is mind, the price graph or any of its components is clearly not a fully reliable indicator that accurately tells us- or allows us figuring out- why and how the member made a commitment to his forecast to begin with. Besides not knowing how or why, we neither do have any real clues about when he initially reached his idea and committed to the forecast. He might actually have been following- or been committed to- this idea a long time prior to when he exposed it, and anyone was aware of it. As such, it is only possible to say something about when he decided to reveal a particular forecast to others, and not deem this occasion as a true indicator of when he essentially made his commitment. Even though it is not possible to know the entire background or history, it is still possible track the forecaster as long as he stays committed. There is still a chance to register what he is telling and showing, both visually and verbally, and to observe how he reacts to events within the community in which he performs predictions. It is also possible to witness his reactions to input from other members of the community and how they react to his contributions. Nevertheless, once the trader disappears for one or another reason, we cannot truly say anything about why he did so. If others detected his disappearance it is possible to follow rumors that are going on, but that is a rare event in this network. So far it mainly seems to happen when people act or behave provokingly or offensively, and then disappear, either by own will or by their account being banned from the network. Most usually, the disappearance of contributors happens unnoticed. At a certain point they are likely to return to the community either with a new visual forecast or just by commenting certain events or other members inputs.

Except for everything, tracking individual contributors during their commitment to the market throughout the course of events still led me towards some interesting findings. As stated already, traders do not really relate or justify their actions based on all the indicators that decorates their price charts. Often, they will justify their choices by reference to a single indicator or a trend line they manually added to the price graph. So basically, their decisions do not seem that "informed" or well-calculated as one might expect after staring at a few very well-crafted and appealing data visualizations.

A common trait that I finally became aware of, during this course, was that owners of the forecasts did not really often change their minds about in which direction they believe the price was heading. Most of the time they tended to remain either "bull" or "bear", without changing opinion. Being bull or bear in the markets simply refers to whether you think prices will go up or down. If you are bull, then you expect the prices to move upwards, and if bear you are expecting lower prices to come. Taking into consideration that they often apply rather small timeframes, between hourly and 4-hourly, it is interesting to witness that they tend to keep persisting in very same direction for that long. In reality, prices very frequently fluctuate and change direction when observed from hourly timeframes. Nonetheless, I realized that contributors could keep persisting and cheering for same direction for several days and even for a few weeks. Unfortunately, in order to be able to persist on a particular direction, the price either have to get stuck in same area for a while, or even worse, move directly in contradicting direction of the forecast. It is possible to run into both types of scenarios, and it is truly amazing to observe how some individuals can keep insisting even after a few miscalculated attempts, and the price consistently moves in opposite direction. At such a point, the price is very likely to be somewhere completely different from where it was when the initial forecast was made, but still, the very same person is expecting and cheering for the price to move in his favored direction. To a certain extent, this may also explain why people rarely, or at times, not at all refers to the indicators that they have on their price graphs. I can imagine that, at such a point they became very irrelevant, because market conditions have already gone through radical changes. From this point forward, what controls the statement of the interpreter is basically no longer an "objective" forecast, but rather his eagerness. What is even more scaring is that, we are only able to track the forecast back to the point when it initially got published in the thread. We definitely do not have any chance to determine whether the contributor already was caught in this bad spiral even before he made his initial forecast public to others. At some point, maybe after a few days, several attempts, and in the meantime also after dramatic change in the price formation, the market somehow moves in the direction that favors the analysts initial forecast. At this point the analyst sometimes enjoys finally making a right prediction and even moving on to do a little shameless self-promotion, and happily receive congratulatory messages from other practitioners. However, pretty often, the market is more eager and limitless than the practitioner's imaginations. This fact implies

that at one point or another he has to give up and leave the scene in silence, at least while for a while.

Below is an example where I followed records of the same person during a period of approximately one week. This is one of the most active traders within the thread. Following the sequence of his forecasts along with the price movement is revealing the behavioral pattern that I try to describe. This person eagerly kept insisting on selling even though the price kept moving in the opposite direction for several days.

DISCUSSION

In ANT, a network configuration that is able to produce and maintain a stream of inscriptions is called a center of calculation (Blok & Jensen, 2011, p. 44). A center of calculation is the same as a macro actor who, by his many connections, to data producing sites, is able to collect and distribute a global overview in the form of simple inscriptions, such as graphs and charts. Thus, a center of calculation coordinates a wide range of scientific practices that are spread out in time and space (Blok & Jensen, 2011, p. 121). This kind of network configurations, that forms a limited but solid representation, macro-structures parts of the social world, in concrete and localized ways, where any social effect produced depends on the ongoing circulation of information (p. 122).

Apart from the efforts to acquire data and maintain the accuracy, quality and reliability, translating this data into a visually consistent inscription is very often the final step of this long and costly process. From the very beginning, I was aware of working on an important topic that deserves serious attention. This is due to tools that are intended to perform data visualizations, support management and decision makers is gaining more popularity and easier accessibility than ever before. Today, it has become considerably easier and more affordable to setup and maintain environments that provides instant and continuous visual intelligence to individuals and companies of all sizes. The diversity of businesses and decision makers who rules out daily, weekly and monthly strategies, based on such information, acquired from sophisticated visual tools, is increasing steadily. Ever more organizations are constructing their very own centers of calculation. A purpose that these inscriptions is used for can often be preparing and planning the time ahead. And the people who does much of this forecasting is often far from having expertise about how these visualizations actually gets prepared and constructed. What might seem like a very neutral and objective inscription can actually mediate a great deal of bias. Decision makers themselves are neither free from bias. There can be a bunch of factors that influence the way they choose to interpret the visualizations.

During my observations and analysis, I encountered a few moments that was decisive for how I came to consider the practice of forecasting based on visual material. While it is possible to inject multiple dimensions of information into data visualizations, it is very likely that we as humans do not possess the capability of abstracting this overload of information, and put it back into action, in

ways that are useful or beneficial according to the objective that is to be achieved. The extra number of attributes and dimensions added to a visualization will indeed make it look more professional and produce a product that is distinguishable from conventional visualizations. The question is, how much of that information has a genuine influence on the decision and actions people make, and in what ways it has.

Getting back to field where I conducted my research, it was obvious that almost every member only referred to only a single indicator if they did at all. This indicates a serious desynchronization between information provided by the attributes of the visualization, and the actual decision that is being ruled out. It is however likely that, at some point there could have been drawn a decision that was at least partially affected by the information that originates from the indicators. Nevertheless, in market conditions where the prediction ends up failing, other forces starts entering the scene, and gains control of the course, as undesired events keeps unfolding. Any new prediction, from that point forward, have less association to information that originates form the indicators. What further complicates the issue is that we neither know whether the publication of an initial forecast really reflects the initial attempt. It is likely that the initial attempt already took place before anybody, but the forecaster himself knew about it.

Another obvious hint of contradicting behavior can be obtained from the unremitting substitutions and changes that appears in the visualizations. Instead of fitting a forecast according to the indications, the indications are more likely being fitted into the biased expectations of the forecaster. On one side the forecaster might underestimate or ignore any indication that opposes his own agenda. However, what is even more remarkable is when indicators do not fit this agenda, they might very well end up being calibrated, substituted, or worse, entirely thrown away.

Even though all these points, discussed above, seems ethically odd and inappropriate to a certain degree, they are all actions that perfectly fits the most common traits and attributes of inscriptions. What especially characterizes inscriptions is that they are combinable and separable, thanks to their optical consistency. They can be superimposed, and most of what we know as structure, patterns, theory and abstraction is actually a direct consequence of this feature. And what is most important is their two-dimensional character, which allows inscriptions to be summarized with geometry. This has resulted in us working on paper, with goals and figures, and manipulating three dimensional

objects "out there" (Latour, 1986, pp. 19-20). For instance, what is awaiting us in the feature, and what we should expect if a specific trend is maintained. These are all great features when considering them from a functional perspective. However, the way people are likely get involved with these traits, that characterizes inscriptions, during processes of forecasting can, as previously stated, be paradoxical. When observing how these traits comes into action and the way they are being approached in practice, it can be thought of as a deceiving practice as well. Instead of allowing signals from the indicators to form, transform or translate whatever agenda they may have, into an updated version, their agenda is much likelier to transform and translate the situation into an inscription that favors its own program. The question could be; if this is a common trait in this particular field, can it then be generalized to other fields as well?

CONCLUSION

During this project, I was following a thread where data visualization is applied as a key tool for forecasting potential price movements. It should not be confused with trading in the markets in general, because there are plenty of other ways to trade such financial assets. For some traders, performing this kind of visualizations, which is a practice categorized as "technical analysis" within the community itself, is just a part of a broader approach to trading. However, amid a great deal of people, that refers to themselves as technical traders, visualizing data is a de facto way of trying to determine market movements, and without visually drawing and estimating the situation they would be completely unable to operate, or communicate their estimations to others.

The main purpose of this research was neither to break the code of how markets "truly ticks", or to generate a grand theory of behavioral codes, but instead to understand predicting and forecasting, through visual material, as a practical performance rather than a cognitive activity. To a certain degree, this entailed setting aside the theoretical properties and attributes of the indicators and calculations involved in the data visualizations and just focus on visualizing and forecasting as a materialized practice. By translating social interactions into material configurations, in this case through data visualizations, it becomes possible to construct and maintain much more sustainable practices. This do not mean that the practice is a correct one, but from this point forward, it is possible to focus on the material (inscription) itself rather than the chain of events that constructs it. The inscription is considered to have established some kind of an ultimate two-way connection between the actor and the data it is made of.

Rather than treating inscriptions just as objective products, embedded with unbiased data and abilities to guide actors in performing neutral and informed choices, it is more realistic to consider them as biased products which no matter what, in one way or another, trigger biased actions. Instead of asking how informative data visualizations are or how many dimensions they reflect, it could be more appropriate to ask how convincing and powerful they are in transforming other actors. The real power of inscriptions should be measured by their ability to translate and transform the programs of the actors, and not the opposite, which in many cases seems to be destiny inscriptions. The fact that they are flat, combinable, flexible and possible to move from one context

to another is not necessarily a strength of inscriptions, it can be a weakness as well. Whether it is a weakness or strength depends to a great extent on what kind of practice they serve to enable.

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