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Abstract

This article provides an analysis of strategic use of ignorance or not-knowing in one of the most secretive industries within the financial sector, namely high-frequency trading (HFT). The focus of the article is on the relation between imitation and ignorance and investigates the organizational structure of HFT firms. Following debates within social studies of finance, the article argues that strategic use of ignorance constitutes and not only prevents imitation. The point is illustrated through ethnographic studies and interviews within five high-frequency trading firms. The data shows how a black-box structure of ignorance was in fact replicated within the organizational setting of HFT firms and re-enacted by the traders. Towards the end of the article the power-politics of the relation between imitation and ignorance are discussed.

Keywords: Organizational structure, high-frequency trading, imitation, social studies of finance, black-box, ignorance.

Introduction

Recently, a few controversial cases have been reported about how some high-frequency traders have made profit from knowing the inside of how other trading firms' algorithms were operating. On 22 December 2015 it was reported in Bloomberg Business that Citadel, one of the biggest players within the high-frequency trading (HFT) industry, was involved in such a case:

... a team of researchers discovered that a rival company's algorithm was outmanoeuvring their automated trader. The algo was placing futures orders it had no intention of filling to entice firms like Citadel into the transactions, then cancelling them, leaving Citadel with money-losing trades. (Leasing, 2015)

The case was that a few traders who had previously been employed at Citadel were able to trade against their former employer. The fact that the traders knew how Citadel's

algorithms would react to certain price moves means that they could trigger these algorithms to act in a specific way.

In the specific case with Citadel, the traders rapidly placed orders with the intent to cancel them before they trade in order to trick Citadel's (and perhaps other investors') algorithms by creating the illusion of demand. The case attracted a lot of attention since this behaviour engages what is known as spoofing and is illegal. However, this article will not be about market manipulation but pays attention to the fact that this crime could only be committed because the traders had inside information about how another firm's algorithms were designed. The traders could imitate Citadel's strategies and trade upon that information.

This article will treat the use of information about others' trading behaviour: how it is protected and how such information is also generated and sought copied. When trading with algorithms (especially high-speed algorithms) it only takes a few minutes for someone to download all the codes and utilize the trading strategies in another firm. Ken Griffin, CEO of Citadel, states in an interview to CNBC: 'What's shocking to those of us in the community is how many important ideas can be expressed in two sentences'. The CNBC further refers to what he said at the Delivering Alpha conference, namely that '[b]ecause they are often very simple to record, you have to be careful how you express those ideas'. Due to the fear of imitation HFT firms remain highly secretive and only in very rare cases are outsiders given access to information about their operation. As has also been noticed by a range of sociologists, HFT firms are highly secretive and access is very difficult or not impossible to obtain (MacKenzie, 2014). Knowing the least amount possible about the trading strategies and their implementation is considered an indispensable tool for managing the risk of imitation.

The secrecy of the HFT industry that Ken Griffin in the above interview is asked to defend has given rise to many speculations and a certain amount of mystery around what HFT actually is and what the traders actually do. Michael Lewis explains that 'the stock market now trades inside black boxes, in heavily guarded buildings in New Jersey and Chicago' (2014, p. 3). Lewis also reports on the case of the Russian HFT programmer Sergey Aleynikov who was charged by the FBI under the Economic Espionage Act for having stolen Goldman Sachs's computer code. The allegations were

similar to those presented in the case with Citadel that the stolen codes could be used to manipulate the markets and Goldman Sachs feared that their codes would be copied, which could lead to immense loss in profit. Frank Pasquale (2015) presents HFT as a symptom of our very modernity and characterizes HFT as a kind of avant-garde finance. He uses the figure of the black-box to diagnose the whole of our society. We now live in what he claims to be a ‘black-box society’ (2015, p. 10): A state of being where trading algorithms do nothing but imitate and we (the public) know nothing about the inside of these firms and the markets in which they operate.¹

Except for the media and such popular accounts presented above no one has paid proper attention to the effects of the secrecy within the field of HFT. In this literature and the academic field generally known as social studies of finance ignorance is coupled to the notion of imitation understood as a strategic act, i.e. when traders are copying the strategies of other traders. I want to turn this relation between ignorance and imitation on its head and consider ignorance itself as a strategic unknown and investigate the kinds of imitations that might be produced from the various structures of not knowing (the attempt to divide, obscure and protect knowledge) at stake in HFT. I argue that the practice of HFT calls for attention to what is called ‘anti-epistemic’, i.e. the ‘study of non-knowledge or the art of how knowledge is deflected, covered and obscured’ (McGoey, 2012, p. 3). While the field of epistemology explores the nature and limits of the production of knowledge I follow its opposite: the nature of the social and political practices embedded in the effort to kindle new forms of not-knowing in order to prevent imitation.

Paying attention to this ignorance or not-knowing presents the black-box itself as an interesting empirical object – a strategic unknown, which might install a specific power-politics. I claim that the black-box (the politics of not knowing the internal workings of a specific practice) itself acts as a figure to be studied in its own right. In doing so, I analyse how the black box is repeated in the organizational setting of the trading room and re-enacted by the traders. The article asks: Does imitation still play a role in HFT?

¹ A black-box refers more formally to the operation of a system, an object or a device defined by stimuli (input) and response (output) without any knowledge of its internal workings (see MacKenzie, 2005)

If so, what kinds of imitation might the black-box structures of not-knowing give rise to?

In this paper, I first turn to the notion of imitation to understand how it has been addressed in social studies of finance and discuss imitation as more and different from mere copying: it is a fundamental feature of studying organizations. The second section develops the tools and methods most appropriate to investigate the relation between non-knowledge and imitation in practice. The third section at a very practical level asks: How do HFT firms organize themselves to prevent imitation? What kinds of organizational design are put in place and how does this relate to the actual trading strategies implemented? The third section treats an empirical example of a recruitment interview in order to investigate how HFT firms get informed about their industry. The question about accessing information amounts to a broader question also treated in this section, namely how can HFT be considered as a community (as Griffin expresses it) if no one knows what anyone else is doing? The fourth section discusses the ‘anti-epistemological’ aspect of the analysis and asks: What power-politics might be installed in such organizational structures and how are they related to the kinds of imitation that might still emerge within and between HFT firms? In the conclusion I summarize the different versions of non-knowledge at stake in HFT and address its consequences.

Imitation and Finance

Scholars contributing to social studies of finance have investigated the technological development of trading practices. However, only few scholars in this field have explicitly addressed this as a matter of imitation. One exception is Donald MacKenzie, who in an article from 2004 writes about imitation in finance and connects it to the technological development from the human-based trading floor to electronic screen-based trading. In this article MacKenzie defines the social in terms of mutual susceptibility and imitation and writes that humans ‘evaluate the behaviour of others, and ourselves to be influenced by the evaluation, actual or imagined, by others of our behaviour’ (2004, p. 84). He defines technology as an ‘extrasomatic’ resource used to mediate such imitation. Technology is part, he says, ‘of the constitution of the social’ (2004, p. 86). He concludes that ‘[i]n the elementary sense of sociality represented by imitation, there can be social connectivities between machines as well as between human beings’ (p. 96). In an impersonal and anonymous market it is in fact possible to

imagine that imitation can take place as traders still receive information about price moves from which they can make inferences about others' judgements.

Daniel Beunza and Raghu Garud (2007) address imitation more explicitly as an aspect of not knowing. They outline what they claim to be a 'false' discrepancy between imitation and calculation by discussing, first, how neo-institutionalists frame imitation as a tool that financial analysts use when they face uncertainty or simply lack of information. Analysts, from the perspective of neo-institutionalism, often resort to 'a lemming-like imitation of their colleagues' opinions' (p. 13), which promotes a decision making pattern that might lead to 'informational cascades' (p. 13). Second, Beunza and Garud refer to the field of behavioural finance and how analysts tend to herd due to the use of comparative compensation schemes where 'firing and promoting decisions are made based on the performance relative to others'. Analysts are encouraged to herd, i.e. 'to copy each other to the extreme of ignoring their own private information when the latter is inconsistent with the view of the majority' (Beunza & Garud, 2007, p. 16). It is from this background that Beunza and Garud argue that imitation is not opposed to calculation. The neo-institutionalists and behavioural finance forget calculation, they claim. They argue that analysts make use of calculative frames through which the collectivity of the financial markets should be viewed.

The attempt to combine imitation and calculation is even more explicit in Beunza and Stark (2004). They show how imitation is closely connected to the tools by which traders observe and make sense of the market. Based on ethnographic observations they show how arbitrage traders use social clues to complement their models and that imitation is not a substitute for a rational calculative model. They further argue that such '[c]alculation is distributed across the human and non-human agents and instruments enacting the trade' and that 'calculation involves judgement' (2004 p. 371). Another key point for this paper is that imitation is seen to exist not only between firms but also within the trading room. Beunza and Stark (2004) show how such judgements are integrated into the specific locale and depend upon the associations among people working in the same physical place. (2004, p. 373). Trading strategies are in their view not separate from the environment in which they are invented. They describe the spatial organization of a trading room and pay attention to how traders are grouped into specialized desks and the metrics and evaluative tools that they use.

Even though imitation is seen to involve judgement and that Beunza and Garud (2007) explicitly aim to correct the neo-institutionalist and behavioural finance approach to imitation the social studies of finance approaches still maintain a position where imitation is seen as a deliberate and strategic action. However, imitation in Barbara Czarniawska's view cannot be reduced to a residual category (2004, p. 121), i.e. a rational response to external factors such as uncertainty. Instead, Czarniawska suggests the notion of imitation as a useful category when trying to understand contemporary organizations. With reference to Gabriel Tarde she argues that imitation is in fact 'a pivotal explanatory concept for those who try to understand the phenomena of contemporary world of organizations' (p. 121). According to Czarniawska Tarde can in fact help us to engage with the dynamics of the phenomenon itself and not focus only on the external causes outside the realm of, in this case, the black-box reality that characterize HFT. She quotes Tarde saying that: '[i]t is Tarde who attracts attention to the dynamics of the phenomenon itself, pointing out that "[o]ur social life includes a thick network of [imitative] radiations ..., with countless mutual interferences"' (Czarniawska, 2004 p. 122).

Inspired by this approach I follow the actors and the various kinds of imitation at stake within and between HFT firms. I suggest in this paper, that HFT requires to be investigated in terms of the productive mobilization of ignorance as a constitutive feature of the practice of HFT. I do so through focusing on imitation as an underlying feature of organizational life, i.e. how non-knowledge and imitation were mobilized by HT traders and other key actors in the industry. Drawing on ethnographic observations and interviews it is possible to trace how organizational actors, mainly HF-traders, perceived and responded to the unknowns within their own work. I do so by first investigating how imitation might be embedded within the organizational design of a present-day HFT trading room and I second adopt a Tardean understanding of imitation. In this way aspects of not-knowing come to the fore that are overlooked in the social studies of finance literature.

Methods and Data

Studying imitation as it happens both within and between trading firms calls for an ethnographic approach that pays attention to the role played by multiple sites (HFT

firms) and how they are connected. I, therefore, make use of a multi-sited ethnography (Hess, 2001; Holmes & Marcus, 2006) consisting of observations and interviews. In practice I followed the traders while trading at their desk. I mainly draw on ethnographic observations from five different HFT firms (or prop-shops as they are called). The visits lasted from only a few hours, or a few days to 6 weeks of consecutive observations. My observations and experiences were written in a set of research diaries. These data are supplemented with 82 interviews with HF-traders and professionals working in the HFT industry, including compliance officers, lawyers and technology providers, who specifically work with protection of proprietary information, information sharing and data security.

When analysing the data I follow the traders' self-description. Inspired by the field of science and technology studies (STS), I draw upon the kind of analysis presented by Gilbert and Mulkay (1984) in their treatment of scientists' accounts of research discoveries. Gilbert and Mulkay do not treat the scientific narratives as if they were transparent accounts of how the science was done, or reliable accounts of how the discoveries were invented. Rather, the analysis is an 'attempt to identify and describe regularities in the methods used by participants' as they make sense of the practice in which they are part (Gilbert & Mulkay, 1984, p. 14). This approach reaches beyond the reading of individual traders' intentional actions. Tarde Sahlin-Anderson and Sevón explain that 'the impetus for imitation' comes from the imitating agent themselves, i.e. 'from their conception of situation, self-identity, and the identity of others' (2003, p. 253). They further state that imitation comes from 'analogical reasoning by which these conceptions are combined' and stresses that 'in order to become appropriate, one must make a comparison with appropriate others ("Who am I?" "What situation is this?"), in order to conduct the consecutive action based on the perceived action and achievements of other actors – thus, an imitation'. (2003, p. 255). I therefore investigate the traders' self-description (i.e. the way in which the traders perceive of themselves and their own practice).

However before I proceed some explanation about the phenomenon in question is needed in order to further develop the methods to study the organizational level. A general HFT firm often goes under the name 'prop-shop', which refers to the fact that the traders trade from their own account. These firms are highly technology driven,

utilizing complex quantitative models and high-speed algorithms and fit with the proposed definition by the U.S. Securities and Exchange Commission (SEC). The latter defines HFT as a subset of algorithmic trading (more specifically as ‘professional traders acting in a proprietary capacity that engages in strategies that generate a large number of trades on a daily basis’ (SEC Concept Release on Equity Market Structure, 14 January 2010). HF-traders would in average be earning 2-3 cents per contract they trade. The strategies are mainly related to statistical arbitrage where traders aim to ‘buy low and sell high’ across exchanges or other trading venues. They often make a profit from exploiting price-differences between correlated products across geographical locations.

One strategy would for example look at the prices at which US Treasury Bonds are traded at the New York Stock Exchange (NYSE) and its correlated futures, which are traded at the Mercantile Exchange in Chicago (CME). If the price of the treasury moves there is a 99% probability that the price of the future will move in sync. The data transmission time from NYSE to the CME is 13 milliseconds. If a trading firm is able to transmit orders faster than this connection (HFT firms have reduced this time to 8.01 milliseconds by utilizing microwave connections) they can earn a more or less risk free profit (Lewis, 2014). This is of course a technologically driven strategy – one that profits from being faster than other market players.² Such more technical details of HFT are important for the present study insofar they affect the organizational structure. The first point to notice was that the technological nature of HFT affected my access to the field.

In the beginning of my stay with the traders I was presented as an academic researcher and considered an ‘outsider’ due to my academic qualification as a social scientist and not a trader or financial expert. From the beginning I was excluded both physically and analytically. Only rarely would a trader agree to show me his desk. At the same time I was the only female in any of the prop shops that I visited, and with a PhD in sociology also the one knowing the least about coding, programming and finance. All of this seemed in the beginning to be a bad cocktail to study the field of HFT. Such considerations mirror Gillian Tett’s study of the culture among traders inside JP

² See also MacKenzie and Pardo-Guerra (2014) for a description of the development towards HFT.

Morgan, which she describes as speaking a foreign language. She describes such problem of ‘not knowing’ or ignorance not as a constraint but a de facto condition that is a constitutive feature of the financial sector (Tett, 2009, 2010). Drawing on such inspiration the problem of access to the field came to be considered as a methodological reflection relevant in its own right and is dealt with throughout the paper. I present an account of what I heard and saw, but also partly, as mentioned above, what they wanted me, the researcher, to hear and see, controlled through the way in which I was given access to the trading room and the different events such as internal meetings, training sessions and recruitment interviews.

This approach of course relies on the assumption that ethnographic methods cannot be considered external to the practices they seek to trace, the field they aim to map and issues that they address (Lury & Wakeford, 2012). Michael (2004) for instance emphasizes how the interview setting itself might contribute to on-going processes of re-assembling, intervening, or co-constructing of the ethnographic setting itself even in small mundane ways. By focusing on the reflexivity of traders and their imitative effects, I attempt to maintain sensitivity to the workings of such more subtle ethnographic devices. The interviews helped me to understand how the HF-traders access the reflexivity of their own setting – making sense of their own statements and practice in relation to the presence of other traders, the physical setting of the trading room and in relation to an outsider (me, the researcher).

In order to protect the traders’ identity and secure anonymity I had to put together the story from many different settings and interviews. What is presented here is therefore not a linear ethnographic story representing the reality of one single firm. The aim is not to generalize across these firms but in a more reflexive style to investigate how the HF-traders constitute an account of their own setting.

The Organizational Black Box

When I visited the first HFT prop-shop in the beginning of my ethnographic work I was quite surprised with the grey and dusty feel it had. This firm was located in a smaller street not far from Wall Street. Entering the hallway and walking up the stairs the facilities looked a lot more like a construction site than what one would associate with a Wall Street trading firm. The entrepreneurial and engineer-like spirit was not to

mistake. The trading room itself was a typical New York loft space. I entered the room and a young guy welcomed me. I asked for the trader with whom I had an appointment. 'He is over there and coding', he said pointing at a guy sitting bent over his keyboard. Another trader turned around and looked at us and then said: 'He is coding for me right now. She will have to wait'. In the meantime I was offered to take a look around the loft.

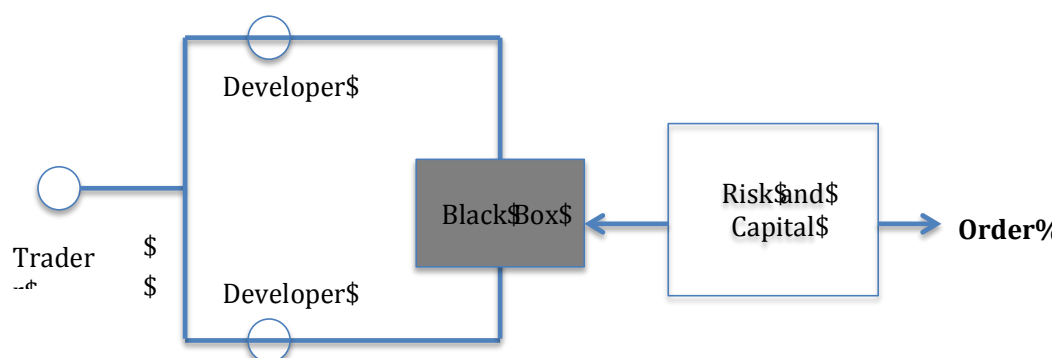
The trading room appeared very calm and quite silent. The two guys would discuss the computer codes. The atmosphere was informal and not anything like the more corporate looks of a Wall Street investment bank or some of the hedge funds I had previously visited. A few of the other traders were making jokes and discussed the news following the latest regulations and law suits within HFT. From the outside, and only taking a first look, the trading room seemed like a relaxed and collaborative atmosphere but as soon as I started to conduct my interviews it was difficult to get my head around what the traders were actually doing even when allowed into the space in which it all happens.

One aspect of this was due to the fact that I was not allowed to 'freely' watch the traders work. I could not (at least in the beginning) watch them trade in the busiest hours of the day (usually before noon) and I could not watch the visualizations of their algorithms running on their screens. What struck me as odd was that no information about the financial markets were ever shared and no fill sounds would reveal any information about their winning or losing trades (see also Borch et al, 2015). In contrast to Beunza and Stark's (2004) description of the arbitrage trading room, which was organized to promote associations and collaborations most HF-traders are sitting isolated at their desks, which were in some cases divided by walls. Most of the HF-traders that I visited had installed filters on their screens so that their codes could only be viewed when facing the screen directly. At the same time the fact that the traders would not interact with one another further complicated the ethnographic observations. The best method to understand what the traders are doing was to interview them while they were trading at their desk. However, even then, sitting in front of the screen with the traders they would most often answer many of my questions by saying: 'That I don't know'. What struck me was their lack of knowledge of crucial aspects of the functioning of their own practice. In the beginning I was suspicious if they would know but might not be allowed, or would not want, to reveal the information.

At a later point in time I had a meeting with a lawyer servicing the HFT industry on how best to protect their proprietary information. I told him about my experience with the traders and their seemingly lack of knowledge or just inability to answer all my questions even after we had signed the confidentiality agreement. He explained that the traders in fact might simply not know the answer to my questions. The traders do not know what happens inside the black box (the software that contain the computer code and where the algorithms and strategies are running). When I at a later point in time confronted the HF-traders, asking them about their lack of knowledge, one explained that he would not know everything that is inside the black box: ‘I know in theory what should be in there, but I wouldn’t know how to code it and if I took the top off one of the boxes – it’s not a real box, but you know – if I took the top off I wouldn’t know...’. I then realized that most of the HF-traders I would later interview did not know all the codes and strategies that I had assumed that they themselves had developed.

The entire algorithmic system (the black-box) is not developed by a single trader but is most often a task divided into different teams. The lawyer explained how this is organized in practice. Most often a team would consist of a trader, a programmer and a developer. The team would work on an independent algorithmic system employing a single strategy. Such a team would work isolated from the rest of the company and each of the team members would only get to see fractions of the strategy. The trader would often be the one who had come up with a strategy that he quantifies in mathematical formula. He would be what is called a ‘quant’, a quantitative strategist or analyst, someone with a mathematical background and he would often have some knowledge about programming (at least enough to know what to tell the developers to do without revealing the whole strategy to them). The developers, who would be proficient in programming or engineering, would translate the strategy into codes. The developers are the ones who are writing the code and in some case also the ones who build the black box (the software package that contains the algorithms and execute the strategies). At the other end of the system (after the black box has been developed) another team consisting of a few developers with similar skills to the team programming the black box but with different responsibilities would take care of the firm’s risk and capital. The risk and capital team ensures that the algorithms do not ‘go crazy’ and act in ways that they were not programmed to. More specifically, the risk and capital team ensured that

the algorithms send out orders that are within the price limits, they make sure to avoid fat finger errors (someone pressing 1\$ instead of 1000\$) and defines loss limits for when the system should stop trading in case of extreme volatility. From this setup the order is produced and sent to the trading venue. This team structure is illustrated in Figure 1:

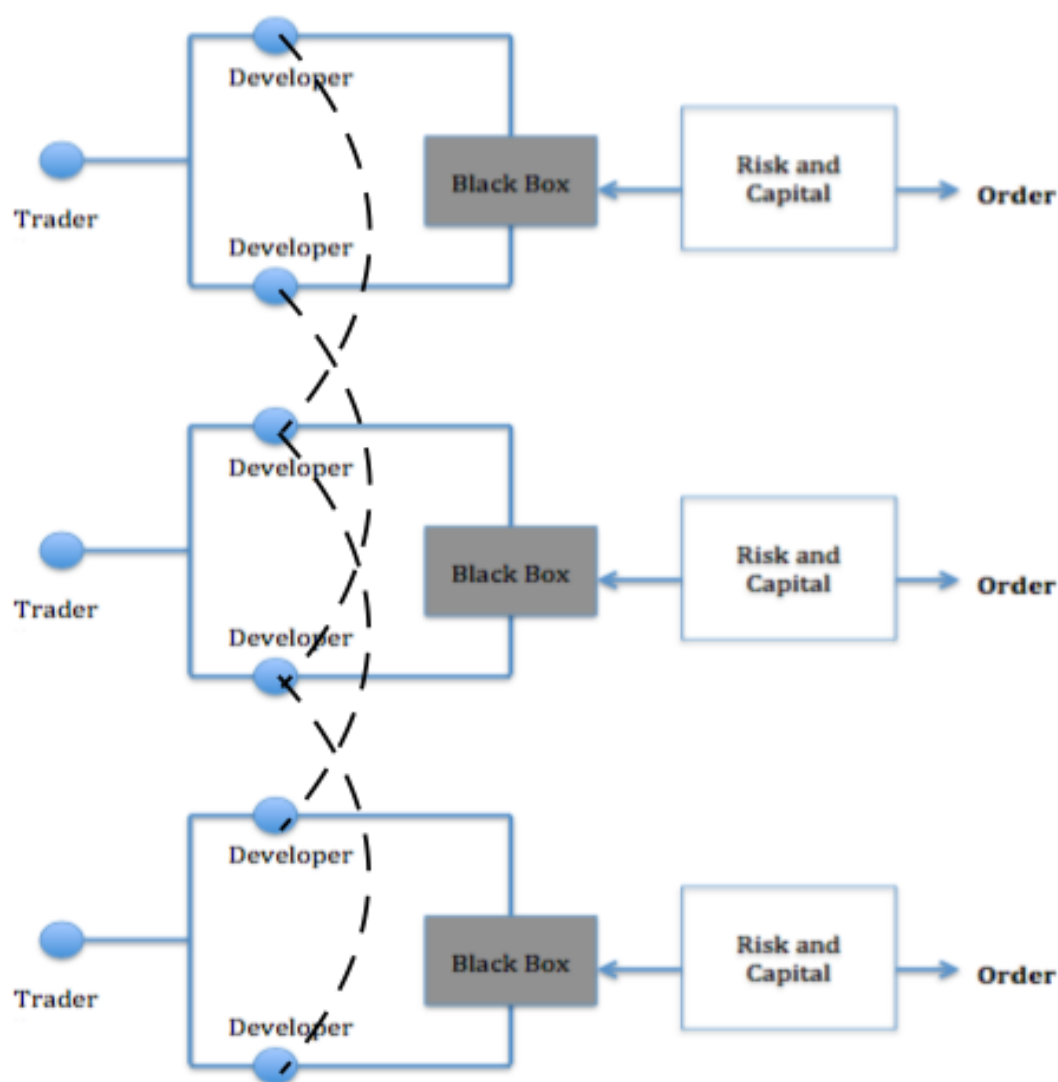


This team structure, the relationship between the trader and his developers can be organized in a number of different ways. A simple ‘horizontal’ model would have the trader to be in charge of his team of developers and they would produce the strategies together. This means that ‘there are a group of people who know the strategy back to front and front to back’ as the lawyer explained. Everyone in the team would have access to the source code and every step from quantifying the strategy to sending the order out would be known. This model means that the organization would have what he called ‘multiple points of exit for intellectual property’. This model is considered as risky one and only used by firms that have developed quite complicated strategies that would be difficult to implement in another firm.³ HFT firms employing faster strategies

³ HFT firms would often combine the two different models and in some cases the firms I visited would have teams working independently and other teams that would work in a more silo based manner. In many of my interviews the disadvantages of the vertical model, such as the loss of intelligence, the inability to accumulate knowledge and have traders and developers that can learn from one another. However, the vertical model would still be the preferred one in order to protect the code base. Some firms tried to circumvent this structure by making rules for when a trader or developers could access the full coding system. So that the longer a trader or developer had stayed in the company the more parts of the code he is allowed to access.

competing for speed would employ a ‘vertical model’ where the development teams might work for several traders and only get to see fractions of the strategy.⁴

The vertical model is illustrated in Figure 2:



⁴ When speaking about the organizational structure of HFT firms it might be worth noting that the organizational setting also diverges from investment banks and other financial organizations like hedge funds and broker-dealers due to the heavy reliance on programming and technologically advanced trading skills. The usual distinction made in the financial sector between back-office (the ones generating revenue for the company) and front-office activities (the support functions that makes sure that trading activities can run smoothly such as technology providers, IT support, human resources and legal functions) become difficult to maintain (see also Lépinay, 2011). Most often the IT providers and legal officers report that when servicing the HFT firms they have a bad time servicing them as they are not allowed access to the whole company. In most HFT firms the employers prefer the traders to take care of such skills themselves. This means that the divide between the ones earning a profit for the firm and the one supporting that function is one and the same person. In fact smaller HFT firms do not have back-office activities.

In HFT firms where the code base is shorter and the strategies quite simple in order to reduce their execution time the codes are more easily implemented in another firm. The vertical model is the most used model for how to organize a trading room among the fastest players in the HFT industry and also the most interesting one for the discussion of not-knowing and to understand the way in which HFT firms organize themselves to protect proprietary information.

A CEO of one of the firms I visited said about the advantages of his organizational structure that: ‘I can silo, using code passes, each of the individuals’.

A HF-trader explained that his firm was organized so that:

[n]obody can steal the entire lot...on this model you haven’t got anybody developing the strategy that knows how it all fits together. It is almost like trying to do a jigsaw with no picture in it. You know you have to find the female bit to fit with the male bit but you don’t know exactly what you are looking for. So that can have costs and other disadvantages compared to a horizontal model where each will know what they have to do efficiently.

It is from these observations of how the traders do not know the inside of their own practice that I argue that the construction of this organizational structure replicates the black box.⁵ Most traders I talked to would not have access to the source code itself and the operation of the total trading system would remain opaque to any single trader. As a partner from one of the firms facilitating the technological operation of such prop shops said: ‘In some cases the head of trading doesn’t know what that algo is doing. They know what products they’re trading but they don’t know the specifics of that algo or

⁵ It can in fact be speculated that such structure is also used as a strategic unknown in the way McGoeey writes about what she calls a ‘will to ignorance’ (2007, p. 216) as no one can hold one accountable for something that they do not know. A more pragmatic explanation was also given by one of my informants – it is simply easier to comply with regulations in the vertical model. Even through the heads of trading may not know the specifics of what the developer or trader is doing they know what kinds of tasks everyone is working on. They are able to assign responsibility to single individuals if something goes wrong. They will know who worked on what parts of the code base at what time.

how it's executing'. One might say that the organizational structure is installed to evoke an atomized team spirit. Everyone is working together but they only fully understand fragments of the tasks that they are working on. Ignorance or not-knowing was integrated into the very design of the trading room and act as an indispensable resource (a strategic unknown) to uphold the operation of HFT practice.

This replication or imitation of the black-box establishes the degree of ignorance that operates in and through the imitating agents. The traders work collaboratively in teams but remain highly isolated from one another. Not only are the firms organized so that the traders do not know the tasks they are working on but they are not encouraged to reflect upon the structure of which they form part. It was only after having spoken to an outsider that the reason for the resistance to answer some of my questions was revealed – the traders themselves do not understand the structure they are in. They were not able to explain to me why they did not know the strategies they themselves had been developing and coding.

Enacting Ignorance

Having presented the organizational design of a typical HF trading room this section investigates how HFT firms get informed about their industry, which amounts to a broader question also treated in this section, namely; how can HFT be considered as a community (as Griffin expresses it) if no one knows what anyone else is doing? I investigate this question by presenting my observations from attending a recruitment interview.

The traders and developers I followed needed a programmer to join their team. The candidate was placed in the middle of the room and the other traders and I were seated in a circle surrounding him. In the beginning the traders asked him some general questions, like 'for how long have you been programming and what is your educational background?' During the interview it was clear that the traders did not know which company the candidate was currently working for. They discussed some of his previous trading experiences years back and asked general questions relating to the infrastructures of how to execute orders most efficiently. Later in the interview they asked the candidate directly: 'So... who are you coding for? What is their implementation strategy? What order types do they use? How long is their holding

period? What kind of co-location services do they make use of?’ The trader answered some of these questions noting that he would not know the answer to all of them. He said: ‘I was the guy who knitted together the whole system. I can’t read all the code’.

This interaction confirms the fact that the traders and developers do not know everything about the practice of which they form part. However, the interview also illustrated something else, namely, the kind of knowledge the traders was actually seeking to access to get to know what other HFT firms are doing and therefore also what kind of knowledge that is considered worth keeping secret. The traders I followed wanted to know how the candidate was executing his orders. The traders explained that their own practice would depend upon the technology used by other traders and one way to stay informed about this was through the recruitment interview. The traders explained that what they can see from the order book is nothing else than actual trades. ‘In no way can I see the intention behind that trading pattern’, one trader explained. Human interaction was therefore stated as a crucial factor to refining their trading practice, which seems to be beyond the coding of specific strategies. ‘It is all intelligence gathering’, one trader said explaining his activity as a HF-trader.

The head of algo-trading, who was overseeing the recruitment process, confirmed this point in a later interview:

I have spoken, you know, I did a lot of [recruitment] interviews... the only real way to learn what people are doing is in the interviews where you’ll tell them as much as you’re comfortable with and they’ll tell you as much as they are comfortable with. In that way you sort of start to feel them out and see what they are doing, and so I know that there’re some pretty smart people out there in the same space who are doing very similar things.

Another trader said: ‘It takes more than an iceberg detector to figure out other market participants’ activities’.⁶ I asked them what they would be looking for in the interviews. The answer was: ‘If they [other HFT firms] have a technology I am not aware off to minimize latency. If they are using order types that I don’t know exists. If they got a better deal on an exchange in relation to the fees they pay.’ All such infrastructure issue are considered to be highly important to keep up with the market.

HFT has more to do with order placement and less with price forecasting – and is highly dependent upon queue positioning – to be in the beginning or at the top of the order book is what matters. The information that is considered highly proprietary is not the strategies themselves but the technology that is involved in reducing latency (the time it takes from issuing and order algorithmically until it gets executed at the exchange). The struggle to be the first to execute is highly dependent upon the technology and infrastructure used by other market participants. One trader explained that:

what’s really proprietary to us is how fast is the software or the hardware that your developers have developed in processing information, unwrapping it, analysing it, wrapping it up, and pinging it out – how long a message or tiny bit of information takes to get from one place to another.

The practice of conducting or participating in recruitment interviews is a way to stay informed with what is happening in the field since it is otherwise close to impossible to know what the trader next to you is doing. To get to know the internal workings of their own practice, the HF-traders were looking to counterparties and colleagues in other firms to circumvent the fact that they are excluded from knowing the inside or internal working of their own practice. This observation is different to Beunza and Garud’s (2007) findings since to get to know, in the field of HFT, what others are doing cannot only be obtained through models. The high-tech and reliance on ever increasing speed makes the imitative practices surprisingly human and low-tech. The traders reassured

⁶ An iceberg order refers to the fact that traders have used sequential order execution to hide their intentions from the market. For instance, a buy order of 200 shares of XYZ would be issued every second minute instead of all at once. In this way other traders would not be able to profit from the price impact a big order might affect in the market. High-frequency traders have in response developed sophisticated algorithms to reverse engineer or detect such ‘hidden size’ in order to figure out other markets participants’ trading pattern (see also Lenglet 2011).

me that they did not consider their coding as any kind of secret source that they had a unique access to: ‘There is no gold – it is all in the implementation’, one said. The traders see themselves as the outside observers of their own practice either pretending to know, or trying to get to know, the inside of the black box.

At the end of the interview they asked the candidate if he had signed a non-disclosure contract, which means that he would not be allowed to reveal any information about his current employer.

‘Yes I did get a PDF, I think, but it is two years ago so it has probably expired by now’, the trader replied’

....and it is non-enforceable’, the head of algo-trading interrupted.

It seemed weird to me that within a business as secretive as the HFT industry that they would not take serious the non-disclosure contract. Normally, in the financial trading firms, a new employee would be asked to sign a 30-page contract with covenants to make sure that the trader does not make use of the codes he has developed within another firm. The covenants would often make sure that a trader cannot work in the industry for 6, 9 or up to 12 years after his resignation. Most firms would rely on their employees complying with the specific covenants and sue the firms that would hire them in breach of those covenants.

However, a lawyer, who used to run a HFT prop-shop, explained that:

the actual theft is very difficult to prove and if there is theft, you’ve already lost it. It’s already being used somewhere else, so even if you do manage to prove that it’s gone somewhere else, it’s already happened... So there are very good reasons for ensuring that if you and I sit next to one another, you and I don’t know what each of the other are doing by putting up a screen because it does mean that our employer doesn’t have to sue you if you leave for taking something that I had developed, because there’s no way you could know what I’ve developed.

Therefore, the non-compete contract was considered to be of no value to the head of algo-trading (and to most other heads of HFT I interviewed).

The fact that the traders would not know the inside of their own practice allows for other kinds of imitation – and emphasises the mutual interferences of different kinds of imitations as Czarniawska explains forms a crucial part of Tarde’s theory of the social. A strategy is implemented and become known and is packaged in a specific generic manner to be traded at another firm for some other information. Imitation in this case is strategically used, acted upon and promoted both within and between HFT firms. The proximity that would normally count as what makes up an organization field – or a community (see Czarniawska, 2004) is not only demographic. No matter how isolated the traders tend to be within their own organizational black-boxes they are already in a market – they want to know what others are doing and want others to know what they are doing (in order to receive information and guide their actions).

Power-Politics of Not-Knowing

The analysis so far has highlighted the constitution of ignorance in the organizational design of the trading desk and the way it was circumvented in the recruitment interview. But there are additional ways in which this black-box structure was circumvented, concealed and barred in order to operate. One example that I have not yet paid attention to is my interaction, as an outsider, with the traders.

At the end of a longer visit to one of the trading rooms I asked one of the traders I had had most contact with if I could watch him trade. He agreed to this, but wanted to turn off the screen showing his codes before we could sit down at his desk. I ensured him that he had no reason to worry since I would not be able to read the codes. He replied promptly: ‘Believe me, I know – but I don’t want anyone to see that I showed you the codes’. Here the social logic suddenly shifted from being about imitating others’ algorithms to become a mimetic aspect of having people observing me observing the codes. In this case ignorance was itself an object to be protected and desired, not the computer codes. This reflexivity amounts to a study that reaches beyond the relation between the trader and his algorithmic codes. As Tarde makes clear, it is social interaction that stimulates imitation (cf. Clark, 2011, p. 16). The functioning of the black box in HFT, therefore, cannot be reduced to a mechanical copy mechanism where

algorithms copy trades of other algorithms. Rather, imitation was socially enacted and reproduced in the image the traders give themselves of what it means to be a HF-trader. This envisions a specific kind of sociality as the black box gave out ignorance as necessity (a code of conduct to be followed). The logic of the black box was re-enacted in practice and guided the way in which the traders made sense of their own practice.

The traders were not allowed to access all the codes but still they would perform this without there being any real reason for it. The reflexivity of accounts contributes to the making of HFT as a matter of ignorance even as its necessity was rejected. That is, reality is enacted by the way in which the traders accounted for the ignorance, which makes HFT ‘accountably constituted’ as black-boxed (see Garfinkel, 1967, p. 15). Put differently, a specific kind of imitation was manifested in a self-conscious display of agency.

After a while I met the same trader in the trading room after everyone else had left for the day. Now he was not concerned about showing me the codes, and he explained in great detail how he had built and constructed the black box system executing his trades. Sitting next to him asking him to decode the different graphs and visualizations appearing on the screen he looked at me: ‘There is nothing else than what you see. HFT is not more complicated than this’. He said in a very serious tone: ‘I have showed you everything now’. This made me all the more curious, and I asked myself: why then all the secrecy?

The CEO of one of the HFT firms made an attempt to explain it. He accounted for his own performance of ignorance as an obligatory necessity in order to ensure diversification of the trading strategies and to prevent the traders from imitating one another. What is (or at least from the outside seems to be) highly guarded proprietary information for one trader is for someone else (in a different place in the hierarchy) a deliberate strategy. The heads of the HFT firms channel or manage imitation to their advantage – to regulate and control it, while the traders try to maintain the idea of ignorance as a response to the organizational structure of which they form part. As Czarniawska (2004) makes clear with reference to Tarde, imitation is composed by mutual interferences. One kind of imitation (a code of conduct) might at the same time also reflect the CEO’s attempt to manage and control.

This point was further confirmed at the end of my stay in New York, where yet another layer of the mutual interferences was added to the story. I was invited to the home of the CEO of the firm. I expected to be able to do one of my traditional interviews and the conversation was going well. Suddenly he looked at me: ‘Okay, we have to switch this thing off now’ pointing to the recording device I had put in front of him. ‘So how has your experience with us been so far? You are asking about the sociology of all of this. Tell me what do you see?’ We discussed some of my observations for a few minutes and then he said. ‘Tell me now what do you see?’ Unsure about what he really expected me to answer, I hesitated. He said: ‘What I mean is, what you get out of your interviews with them [the traders]? There is no way they are going to reveal their intentions to me’.

The black box logic of not-knowing was in this instance taken to a new level – suddenly I was inside and acted as a spy within a setting I had previously been excluded from observing. I was as an ignorant observer able to interact without intervening (i.e. informing the traders about the other traders’ work). Not only was the organizational structure designed so that the traders did not know the tasks they were working on but they were not encouraged to reflect upon the structure of which they formed part. The black-box structure was concealed and I was (in my capacity as an outside observer) drawn into the game. I was wondering: How much can I tell him of what I really know? And what if the traders find out that I told him? Suddenly I was the one being happy that the recorder was switched off. It seemed to me that everything was about ignorance and imitation; the traders were either hiding intentions or displaying them to direct someone else’s behaviour into mimetic relations.

Not only were the traders creating their own context or accountable setting as a mirror of the black box, which they imitated, so was I, the researcher. I had been assuming all along that if I could only watch and achieve the skills to read the codes (getting inside the black-box) I would fully understand the whole picture of what they were doing. I assumed a reality to be there out of my reach. I imitated, as it were, the traders’ version of the black-box. The limited access and ‘you know more than me’ attitude placed me both at the inside and outside of the practice I observed.

To put filters on screens and dividing the different desks in order to prevent imitation between traders does not equal the elimination of imitation altogether. In this case, the fact that the managers exclude themselves from knowing the inside of the black box stimulated ‘mimetic infiltration’ (Borch, 2010, p. 236) between the organizational silos (trading teams). This was done by, first, the fact that traders informed themselves via conducting interviews with other HFT firms, second, that the traders tend to imitate a shared image of what it means to be an HF-trader and, third, by the management accepting (and making use) of my participation as a researcher in the firm structure. In this case, the attempt to prevent any possible imitation between trading desks generated new organizational qualities and other forms of collective connectivity.

Throughout the article I have outlined the associations and relations that make up an HFT trading room and aimed to show how HF-traders are effectively aligned or connected through their isolation and that the black-box may be seen as a strategic unknown – replicated or folded into the organizational setting. It is in this way that the black box are in fact suggestive of a specific type of power-politics. The black-box projects a particular role to be enacted by the traders – one that has not much to do with the trader and his algorithms, but is produced in and through the way in which the traders enacted and re-enacted ignorance as a strategic resource crucial for the functioning of an HF trading firm.

Conclusion

In this article I have showed how the technological development towards HFT reconfigures the trading room. I have done so by describing how ignorance is an integral part of the organizational design of the HF trading room. I have showed the different versions of such forms of non-knowledge: from how it is enacted, sought to be circumvented and strategically exploited. I argue that imitation cannot be reduced to merely copying or replicating codes. Instead, what an anti-epistemological perspective alerts attention to is the inside (the black box or the unknown itself) as a context from where to make sense of HFT. By presenting an ethnographic account of HFT traders I have identified the black box itself as an interesting empirical object to be unpacked (as something more than ‘just’ an anthropological inaccessible or hidden reality). Thus the black box is more and different from a purely diagnostic metaphor, it has a distinct social dynamic attached to it. The traders I followed identified themselves with the

black box reality and thereby created their own reference. They imitated the black box logic of which they form part: a structure where the internal working of the system remains opaque to any single trader.

The organizational structure, the interaction among traders and their interaction with me demonstrated a logic that we might say folds in the outside to become in Riles' words 'internal to the construction of its own reality' (2001, p. 3). A range of variations of imitation came into view from seeing the black-box itself as a strategy to protect the copying of trading strategies to the view that ignorance itself became an object of desire. Ignorance is, in the case of HFT, not opposite of knowledge, but gives rise to new ways of knowing or in this case more precisely new ways of accessing knowledge. As such, the idea of imitation contributes to the enactment of ignorance by providing a 'regulating conduct' enacted in and through the imitating agents (the HF-traders themselves).

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