What is a 'Real' Transaction?

Infrastructures, relations and Spoofing in High-Frequency Trading¹

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What is a 'real' transaction? For (at least, some) social scientists, the word 'real' evokes a messy philosophical quagmire. But in contemporary finance, references to the 'real' instigate the concrete politics of fairness and legitimacy that are central to public discussions about markets and their role in late capitalist societies; the 'real' really matters in finance.

Consider, for example, recent debates on high frequency trading, a series of practices that entail using sophisticated computers and telecommunications systems to exploit minute arbitrage opportunities in the electronic trading platforms that structure stock and foreign exchange markets today (Chordia et al, 2013). High frequency trading, wrote the leading broker Charles Schwab in a statement in 2014, is “an explosion of *head-fake* ephemeral orders – not to lock in *real* trades, but to skim pennies off the public markets by the billions” (Wall Street Journal, 2014). The firms participating in these activities, noted Peter Henning (2014) of the *New York Times*, have “no *real interest* in the underlying value of the companies whose shares they trade”. What does it mean, ask fund managers and other institutional investors, that high frequency traders own stocks and other instruments for only fractions of a second? What does it mean, indeed, that some stocks are now more liquid and fungible than money itself?¹

What matters, surely, is not whether a transaction is real 'in actuality' but rather the conditions under which market participants come to evaluate it as such. I want to reflect on the original question precisely under this light: as a test

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of how market actors come to see transactions not only as legal or illegal, legitimate or illegitimate, moral or immoral, personal or impersonal, but more fundamentally as being real against the possibility of being false, fake or fictitious.

The question of what differentiates the discursively real from the fictitious can be adequately resolved through existing approaches. Relational economic sociology, for example, would place attention on how views about the 'reality' of particular transactions are tied to the identities and intersubjective evaluations of the agents involved in exchanges (Zelizer 2000, Wherry 2016, Bandelj 2002). The 'reality tests' performed by social actors might similarly be thought of as classification struggles concerning the status of transactions (Thevenot 2007); or as given by recourse to broader evaluative socio-technical frameworks (Beunza and Stark 2004); or as parts of larger cultural conceptions that shape notions of exchange, property and control (Fligstein 2002); or even as material devices that perform worlds into being (Muniesa et al 2007).

Here, I complement these approaches by arguing for the importance of studying moments of conflict, breakdown, and maintenance of locally shared stable 'realities'. While extant studies of economic life have provided great insights about how category making and boundary building infuse transactions, less has been said about how taken-for-grantedness is stabilized in economic worlds. My objective, then, isn't to expand on accounts of how 'the real' is created through relations or fashioned as a shared category of qualification. Rather, I use this as an opportunity to examine how market actors articulate their senses of what is real by mutually coordinating expectations about their naturalized and "unquestioned conceptualization[s]" (Frank 1979). These 'reality tests' are moment for the concerted reconstruction of expectations, spaces where potentially contested relations and categories are made 'unquestioned'. In other words, to determine what is 'real' is to perform an infrastructural inversion (Bowker et al 2009) that exposes the devices, techniques, practices, and objects assumed to ground action in the field, to then cool their meanings into a stable form.

At stake here is the importance of placing attention on how infrastructures create the conditions for action in economic life—and how agents wrestle with the obdurate installed base where they truck, barter and exchange and refer to it in moments of breakdown and conflict. The definition of the real is necessarily informed by the shared recognition of how things ‘naturally’ work at an everyday operational level. In studying controversies about the reality of transactions, placing attention on these expectations and their infrastructural correlates matters: controversies are settled by seeing whether solutions pass a certain reality test—that is, whether they ‘make sense’, given the infrastructures that ground routine action.

In this paper, I study the place of this form of infrastructural inversion by looking at how financial market participants deal with the reality of so-called spoofing in high frequency trading. An old practice, spoofing involves manipulating market prices by submitting “false” orders to buy and sell securities. In the context of electronic financial markets, spoofing has become a particularly notable object of contention for regulators and market participants alike: at the core, the issue is determining the reality of trades. Is a trade ‘real’, the product of clear intentions to exchange, or is it simply algorithmic smoke meant to hide an underlying reality?

Transactions that matter

The reality of economic transactions indexes the larger and more provocative complication of the realism of relations in general. At the core, all transactions imply a relation, whether rooted on distinct interpersonal interactions, as in street markets and intimate exchanges (Zelizer 2009; de la Pradelle 2006), or mediated by impersonal systems such as trading screens, mobile applications, or automated point-of-sale systems (Vargha 2011). When two agents exchange, they are tied for the duration of their transaction; they are related, even if through their membership of a community of exchange (Weber 1978). This patently relational character of exchange invites rethinking the more general

issue of relatedness. When can we say that two things, or two individuals, are relatives of a certain kind?

The answer to this might seem entirely trivial: a relation, as a prominent relational scholar noted over conversation, is simply a meaningful connection between people. Relations are the fabric of society (Simmel 1949, 1950; Aldous 1972; Durkheim 2014), and their existence is in many ways a given in sociological thought (White 1992). Consider, for example, Zelizer's (2009) sophisticated work in relational economic sociology. Although valuable for stressing the importance of relations within the apparently impersonal sphere of economic transactions, Zelizer's approach nevertheless under-theorizes how relations are constituted in the first place. And in this, Zelizer is certainly not alone. Conventional approaches within sociology (and in economic sociology specifically) treat relations as either contextual reflections of broad shared social categories, or as processual outcomes that reproduce affinities, dispositions and mental categories through the strategic action of the actors who create networks of interpersonal connections (see also Erikson 2013). Think too, as an illustration, of Mustafa Emirbayer's now classic *Manifesto for a relational sociology* (1997). An erudite theoretical survey that defends a transactional view of the social world, Emirbayer's analysis nevertheless fails to identify the boundaries and dynamics of relations and their constitution. "[B]onds, not essences, provide the bases" for social outcomes, notes Emirbayer with reference to Tilly (1999); in avoiding the constraints of substantivism, though, little is said about the makeup of such fundamentally important bonds—"the very fact of connectivity itself" (Emirbayer 1997) is implied in how analysts discern meaningful relations within the field.

'Meaningful relations' are neither empirically nor theoretically obvious. Consider biological lineage, an exemplar of the prototypically meaningful relation in Euro-American imaginaries (Schneider 1980). There is something meaningful within familiar relations, as Zelizer notes, tying individuals, motives and transactional media in distinct ways (Zelizer and Tilly 2006). Monetary transfers between spouses or across parents and their offspring occur not as

impersonal interactions but are bundled in an intricate package of emotional ties and expectations of reciprocity that encode specific notions of familiarity. Biological lineage, however, only translates into meaningful relations in certain circumstances. Take the Paiela, for whom relations are “subjected to the test of time fall by the wayside depending on the warmth of that relationship” (Biersak 1982). Biological relatives that fail to provide support are ‘false’ kin, whereas those that offer are thought of as ‘true’ kin. More proximally, think of discussions about relatedness at the intersections of law and biomedical knowledge: transformations in reproductive technologies and legislations around their use imply that biological familiarity no longer guarantees relatedness in Western societies but does so only under finite combinations of law and technique. A surrogate mother can only lay claim on her child in specific legal circumstances, in the same way that the donator of a gamete is not guaranteed relatedness to his or her genetic offspring. Relations are always underdetermined, be it by law, shared social knowledge, or by technologies of property and reproduction (Shalev 1998).

This argument clearly evokes Strathern’s (1995) provocative querying of ‘the relation’ as a central analytical object in contemporary anthropological thought. Social anthropologists, writes Strathern, “route connections through persons”, attending to “the relations of logic, of cause and effect, of class and category, that people make between things [but also] to the relations of social life, to the roles and behavior, through which people connect themselves to one another” (1995: 11). Such routing is the “substance of anthropological empiricism”, she continues, creating a ‘double emphasis’ on relations “known to the observer as principles of social organization and relations observed as interactions between persons”. Social structure is thereby located in relations that are “relevant to people’s acts and intentions” (1995: 12). The consequence of this ‘double emphasis’, she adds, is that persons are discerned “by their relations to one another”. The varieties of relevant relations are thus plentiful. As Strathern notes referring to Gregory Bateson’s work with the Iatmul, kinship takes unexpected forms: for the Iatmul, “human beings are simply one manifestation of clan persons also manifested as every conceivable entity in the

environment [...] Yams have personal names, give birth, respond to speech, walk about at night" (1995: 16). The object of anthropology, then, is not to take relations as ontologically given but to understand their patterned variations and trajectories (see also Vivero de Castro 2002). The boundaries and dynamics of relations are never entirely trivial: indeed, the task at hand is finding how relations and personhoods are co-constituted, rather than taking for granted the existence of a dense relational system that serves as the basis of order, strategy and signification.

If anthropologists route relations through persons, economic sociology channels society through the relational individual. Consider Bourdieu's late work on the French housing market (2005). In commenting on Harrison White's interactionist model of markets as spaces of strategic action and mutual observation, Bourdieu suggests subordinating such perspective "to a structural analysis of the conditions that delimit the space of [the] possible strategies" of actors (2005: 208). By understanding the economic habitus as a "conditioned and limited spontaneity" that drives the formation of connections within and across fields, Bourdieu brings the categories and structures of the field directly into the relation; he routes structure through the individual's relational tactics. This is, of course not entirely surprising: in his earlier work, Bourdieu suggests that terms of address and reference—elements central to the production of a relational connection—"are first and foremost kinship *categories* [that] contain the magical power to institute frontiers and constitute groups, by performative declarations [...] that are invested with all the strength of the group that they help to make" (1977: 170). Such *categoremes*, as Bourdieu notes, "institute a reality" based on the legitimacy of accepted kinship categories and their implicit relations.

For economic sociologists, then, Strathern's work presents an interesting challenge: while cognizant of the importance of relations in economic life, it compels re-thinking how relationality is constituted and maintained by specific forms of knowledge, technique, and mediation. Here, infrastructure studies provide a potential point of articulation. Firstly, like both Strathern's

anthropological critique and the program of relational sociology, infrastructure studies deal with the apparent opposition between categorical or substantivist approaches and transactional or processual accounts of social life. For Strathern, the anthropological relation is divided:

On the one hand are those relations seen to make connections through a logic of power of articulation that acquires its own conceptual momentum; on the other hand are those relations that are conducted in interpersonal terms, connections between persons inflected with a precise and particular history (2005)

These two elements, the abstract and the particular, are necessarily conjoined in a tandem. Interpersonal relations create what is conceivable, whereas the conceptual apparatus provides social life to—or infuses with meaning—the interpersonal:

it is through the interacting with persons that diverse interactions and further connections become intellectually conceivable [the interpersonal creates possibilities for the conceptual], while it is through creating concepts and categories that connections come to have a social life of their own [the conceptual as a terrain for the potential interpersonal]

Kinship provides an example, where the eminently abstractive conceptual apparatus of law meets the apparently thicker everyday experience of interpersonal, familial connections. The law is not independent of these, as through court cases and battles over relativeness novel categories get made. Conversely, law shapes our everyday experience: who can marry whom, who is deemed a sibling, who has parental responsibilities, are subjects of legal technique that affect our capacity to create kindred groups in our intimate lives. Through the tandem, Strathern evinces a connection between the relational and the infrastructural: between densely inhabited proxies of concepts—worlds of classifications, gateways, standards, protocols, measurements, templates—that make relations possible—by connecting machines, encrypting signals, or locating cases in the same classification situations. Relations are always “people related through some other criterion” (2005); infrastructures are to relations what the abstract is to the particular.

Secondly, the concept of infrastructure is relevant because it is doubly and essentially relational. It is relational in an analytical sense, as Star and Ruhleder (1996) observed: something is infrastructural not in and of itself but only with respect to a particular community and set of practices—there is no substantive quality of being infrastructural *without* reference to practices and knowledges. But infrastructures are also relational in an operational sense: they enact relations by re-creating categories of membership, equivalence, and interoperability. Think of paradigmatic forms of infrastructure such as platforms, standards, and classification systems (Edwards 2010, Star and Bowker 2000) that, like relations, ‘summon to the field’, discriminating between “all those possibly connected and those whom one chooses to recognize”. Standards and classifications order entities by locating them within specific categorical systems, but in doing so they also enact associations and dissociations, relations of similarity and relations of difference. This is visible in the recent work by Fourcade and Healy (2013), whose Weberian-inspired analysis of classification situations points at how infrastructures—from credit scoring systems to crowd-sourced mechanisms for wine rating—operate as distributed sieves that sort people, things, and evaluations along specific orders of worth—infrastructures facilitate this type of classification situations by making them durable and naturalized. Indeed, the construction of a stable reality for market actors is necessarily predicated on the infrastructural work carried out by others: what is second nature to those involved in a transaction, what is obviously and blatantly a “meaningful relation” for parties to an exchange, is some other actor’s rebuttable convention (Boltanski and Thevenot 1999) of counting, ordering, and technical interoperability. Like Strathern’s tandem, the double condition of infrastructures makes possible alternative accounts of how stable worlds emerge: they do so not only in reference to the creation of collective, intersubjective, front-stage categories shared by actors in a particular field, but also in connection to how relations are reflected upon the infrastructures that support the field’s operation; contested relations are ‘tested’ by how well they fit with extant infrastructures.

Note the potential shift in explaining sources of stability and change in the 'real economy'. Existing institutional, relational and processual accounts place great emphasis on how, during moments of conflict and uncertainty, actors create shared repertoires (Swidler 1986), dominant cultural conceptions (Fligstein 2002), and accepted frames of interaction, narrative and interpretation (Bandelj 2003; Goffman 1978) that allow closing controversies and coordinating action. In Swidler's classical account, for instance, unsettled times are wrangled by recourse to ideologies that bring together actors from distinct cleavages fixing them on common expectations (Swidler 1986). For Fligstein, the key problem of market actors is curtailing competition by creating shared, field-level conceptions of governance, exchange and control that produce stable and predictable worlds within the market (Fligstein 2002). And for Zelizer and Tilly's (2006) account, actors participate in the ongoing construction of boundaries through which they collectively stabilize exchanges and tie these to extant social categories. In these as in other approaches, the 'real' field of the economy is conceptualized as a space of front-stage action: what matters to markets and institutions are the knowledge and practices of the actors engaged in exchange—producers observe producers, firms observe firms, 'real' actors with 'real' relations.

The dual condition of infrastructures, however, allows considering how front-stage actors refer to 'deeper' operational planes to settle disputed moments and coordinate action. Actors do not invent the world anew every time there is a controversy or critical moment nor do they constantly engage in a reflexive production of boundaries and classifications (cf. Bourdieu 2005, Zelizer and Tilly 2006). Rather, actors refer to existing conceptions of what is taken for granted, of what works *in practice* in taken-for-granted action. Infrastructures, then, bootstrap the sense of reality shared by actors, anchoring accounts of what is possible, desirable and permissible in moments of uncertainty.

In what follows, I explore how this perspective allows understanding the dynamics of contentious transactions within high frequency trading. I do this by exploring recent discussion on spoofing in American financial markets. An old

practice that involves submitting orders without the intention of their execution, spoofing is a form of market manipulation, made illegal under the reforms of the Dodd-Frank Act in the United States. While the legal boundaries of spoofing may be clearer today than in the past, there remains a notable complication: the difference between spoofing and bona fide trading is neither clear nor obvious. And this is where looking at infrastructures play an important role.

Spoof!

What is at stake in the reality of spoofs? In addition to its pecuniary implications, spoofing elicits ontological and moral uncertainty in market transactions. Questions of spoofing remit to more substantive discussions about the makeup of society: if exchange is, indeed, productive of social cohesion (Bearman 1997; Mauss 1997), if relations matter for creating the forms that give life to the social, then 'false' or 'fake' exchanges corrode the character of markets. Fake transactions, like the danger of fake relations, challenge idealized principles of market and society, respectively.

Spoofs are challenging because they are difficult to identify: the process for generating a legitimate order to buy and sell securities and a spoof is much the same; both start their lives as standardized messages produced by the trading systems of brokers and other investment intermediaries that travel as electronic signals to the computer servers of exchanges where they are processed. A false order will not sink in water, nor will it look differently on the trading screen. Rather, what differentiates the real from the fictitious is the intent of whoever originated the trade or its underlying automated trading system. A real trade, market participants would say, only exists when it was made *bona fide*. This is precisely how law singularizes spoofing: as an activity that distorts *true* prices through calculated deception and manipulation. For example, since the securities markets reforms of 2001, it became unlawful, under Section 10(b) of the Securities Exchange Act 1934, "for any person, directly or indirectly [to] use or employ, in connection with the purchase or sale of any security [...] any manipulative or deceptive device or contrivance". Similarly,

under section 17(a) of the Securities Act 1933, it is unlawful to “employ any device, scheme, or artifice to defraud, or to obtain money or property by means of any untrue statement of a material fact [...] or to engage in any transaction, practice, or course of business which operates or would operate as a fraud or deceit upon the purchaser.” Legal prohibitions against spoofing in particular (rather than market manipulation in general) are even more recent: in the United States, they were only coded into law with the Dodd-Frank reform of 2010, when spoofing was defined as “bidding or offering with the intent to cancel the bid or offer before execution”. This definition was reaffirmed in the courts, where spoofing was interpreted as “non-bona fide orders, or orders that the trader does not intend to have executed, to induce others to buy or sell the security at a price not representative of actual supply and demand”.

The notion of intent as a placeholder for reality is at the core of these and other definitions of spoofing and market manipulation. But establishing intent is notoriously difficult (e.g. in parenting, Coleman 1995 and Wald 2006), particularly in the context of a system (the market) where actors are mostly anonymous and their decisions are supposed to reflect personal, subjective valuations and the ever changing state of public information (Malkiel and Fama 1970). It is not unlawful to be a bad investor, nor is it illegal to change one’s mind. It is also not unlawful to consider investment strategies that are contingent on other events (“Buy XYZ while ABC goes up”). It is also perfectly legal to submit orders that are completely nonsensical (and thus that have no real likelihood of being executed). But determining the existence of spoofing requires discerning the actual motivations of an individual trader or the designer of an automated trading system. “Identification of an abuse”, writes legal scholar Jerry Markham “is itself problematic, since not every advantage or stratagem is abusive even if it provides advantage to its user at the expense of others. The phrasing of law is also far from trivial: if a strategy is based on a probabilistic expectation of execution (say, that 1 of every 100 orders submitted to an exchange will be executed, expecting to cancel the rest), can one speak of intent, as defined in Dodd-Frank? How to distinguish lousy, erratic, jittery or informed

trades from active forms of deceit? In other words, when is a transaction real? When do market participants say that a market relation exists?

A partial answer is provided by the Commodities Futures Trading Commission's (CFTC) Interpretive Order on spoofing (Federal Register 2013), a document that serves as guidance in cases where there is suspicion of market manipulation. For the CFTC, distinguishing between legitimate trading and spoofing requires evaluating "the market context, the person's pattern of trading activity (including fill characteristics), and other relevant facts and circumstances". To aid comparisons, the CFTC The Commission provides "four nonexclusive examples of possible situations for when market participants are engaged in 'spoofing' behavior, including: (i) Submitting or cancelling bids or offers to overload the quotation system of a registered entity, (ii) submitting or cancelling bids or offers to delay another person's execution of trades, (iii) submitting or cancelling multiple bids or offers to create an appearance of false market depth, and (iv) submitting or canceling bids or offers with intent to create artificial price movements upwards or downwards." Note that within the CFTC's Interpretive Order, intentionality is framed with respect to specific technical conditions: "overload of the quotation system", "delayed execution", "false market depth", and artificial price movements. Indeed, although the CFTC does not interpret spoofing as an activity restricted to "trading platforms and venues only having order book functionality", it nevertheless ties spoofing to a specific technical device, the electronic limit order book.

Order books and second order intentionality

Electronic limit order books are central to the operation of modern financial markets, particularly those dominated by automated trading. They are relatively new inventions: while order books have an old and illustrious history, the first generation of electronic limit order book traces back to the 1960s and early 1970s when they were introduced at the margins of the financial system to reduce operational costs in the matching and executing of trades. By the late 1980s, electronic order books had been adopted throughout the world, and by

the mid 1990s they were wildly recognized as the ‘inevitable’ technology at the core of the marketplace (Pardo-Guerra forthcoming).

Order books are infrastructural to finance in at least two ways. First, across countries and asset types, the majority of trading today is either routed through or executed in an electronic limit order book. In the United States, for example, at least 59.2% of the trades in equities are automated through order books (with a remaining 22% tied to manual, yet electronic, trading), whereas 97.1% of the most common (G10) foreign exchange operations go through the book. Indeed, soon after their introduction, electronic limit order books became the undisputed standard for building a market.

Second, and perhaps more importantly, trading strategies are often designed in reference to the order book’s dynamics. Order books matter not only because they are operationally necessary; importantly, their technical details determine, to an important extent, the space of strategies available to market participants. A cursory exploration of ‘practical’ publications in algorithmic and high frequency trading exposes this well: unlike a previous generation of textbooks in financial economics—concerned mostly with determining risk adjusted equilibrium prices—contemporary manuals focus on so-called market microstructure that involves understanding order book dynamics and the effects of variations in market design on aggregate patterns of trade and the profitability of specific trading strategies. Algorithms are designed to fit the functionalities of specific order books, exploiting different ways of signaling information, modifying orders, and executing trades (Balarkas and Ewen 2007; interview with platform developer, 2013). In addition to the very simple limit order (an order to buy or sell a certain volume of securities at a certain price), an order book may process Calendar Spread Orders (that instruct to buy one delivery month of a contract and sell another delivery month of the same contract, at the same time, and on the same exchange), Deferred Orders (that sit on the order book until triggered), hidden orders (that are not visible to other users), or any other of the 1200 order types available in American financial

markets across the sixteen national securities exchange recognized by the SEC (Mackintosh 2014).

What matters, in this sense, is that action is tied to infrastructure in concrete ways. The meaning of a relation, then, is indexical to its infrastructure. As if a pragmatist evaluation (Dewey 1939), the reality of a potentially fictitious market transaction in contemporary finance is gauged in connection to how it represents 'proper' or 'expected' uses of the order book.

Such indexicality is apparent in how the question of spoofing is resolved in courts of law. While market manipulation is as old as organized finance, the first legal criminal for suspected spoofing under the Dodd-Frank Act occurred only recently, in 2011, when the Commodity Futures Trading Commission of the United States and the Financial Conduct Authority of Britain brought charges against Michael Coscia and his Panther Energy Trading for illegally manipulating markets on the Chicago Mercantile Exchange and the Intercontinental Exchange. Agreeing with the Department of Justice, a grand jury indicted Coscia in late 2014 on six counts of commodities fraud and six counts of spoofing. During the ensuing trial, the government argued that Coscia knowingly "entered large-volume orders that he intended to immediately cancel before they could be filled by other traders" (*US v. Coscia*, Indictment, 2015).

Coscia's defense relied on two arguments. First, that the trial was itself procedurally incorrect because existing statutes against spoofing were simply too vague, encompassing "much routine, innocuous conduct by commodities traders" (*US v. Coscia*, Motion for Acquittal, 2015). Second, Coscia argued that both intent and manipulation were not evident. Since he never made an explicit false statement or material representation about when or how he would cancel the orders submitted to the market, he rejected his actions as frauds (*US v. Coscia*, Memorandum opinion order, 2015).

For the prosecution, however, Coscia's intentions were clear: his strategy transpired the intent to cancel orders systematically, differentiating his conduct

from other, widely accepted legitimate practices such as fill-or-kill and partial-fill orders. According to the government's legal team, Coscia manipulated the market by conveying "a misleading impression to customers" through his activity (*US v. Coscia*, Memorandum opinion order, 2015). That he had not misrepresented his intentions beforehand was simply immaterial. Indeed, much of the proof offered by the prosecution consisted in highlighting the logic of Coscia's strategy which consisted of so-called layering orders, that is, placing large orders to buy and sell instruments slightly above and under the best bids and offers in the book, creating a "false sense of supply and demand". Through this, argued the government, Coscia affected the offers of other (principally algorithmic) market participants and profited from market movements artificially created by his fictitious orders (*Financial Times* 2014).

Note the nature of the evidence presented by the prosecution: it involved opening up the CME and ICE's order books—performing an infrastructural inversion, of sorts—to discern the aggregate nature of Coscia's actions by tracing the fine-grained logics of transactions. The indictment, for example, accused Coscia of knowingly transmitting "to a CME Group server Euro FX currency futures contract orders that he intended to cancel before execution, so he could purchase 14 contracts at a below-market price and then sell them immediately thereafter for a higher price, in order to obtain a profit of approximately \$175 in less than a second" (*US v. Coscia*, indictment, 2014) (Though Coscia's indictment included only six counts of spoofing, none of which resulted in more than \$500 in profits, Coscia is thought to have engaged in multiple events, earning \$1.4 million over little less than three months). The intent of these orders was not established from confessions or other first-person statements, but rather was inferred from the strategy followed by the defendant in the context of what was possible and expected within the order book. In addition to testimony by Coscia's programmer, the government relied on the expert testimony of Hendrick Bessembinder, a Professor of Finance at the University of Utah and specialist in market microstructure theory, who set much the tone for the trial. As Bloomberg reported, Bessembinder "went through data for the jury that showed that even after orders were filled there were attempts to cancel them by Coscia's

algorithms” (Louis et al 2015). The construction of intent relied heavily on Bessembinder’s representation of how the book works. “The only way trading is generated in electronic markets”, noted Bessembinder,

is through order submission. So if one is seeking to generate trading, seeking to generate a reaction, the only way one could do that is by inducing people to change their order submissions. [The] high fill rates on the small orders [suggest manipulation]. They were not only very high relative to the fill rates on the large orders, they are actually remarkably high for fill rates for other high frequency traders, so the high fill rates on the small orders are certainly very much consistent with the idea that the reaction that was generated was to induce other traders to submit orders to trade against, interact with the small orders.

Bessembinder did not speak of Coscia’s intentions; he did not “implicate intent as to any element of the crime charged” (*US v. Coscia*, Memorandum opinion order, 2015). Rather, Bessembinder’s testimony suggested to the jury what is expected of *normal* order book dynamics, signaling that the only possible way of making sense of Coscia’s orders was as fictitious dealings. The order book linked native conceptions of intent with the specific technical repertoires of market microstructure economics. And the coupling was effective: in early November 2015 and after but an hour of deliberation, the Chicago jury found Coscia guilty on all twelve counts.

The trial of Michael Coscia was historically momentous in at least one important way. In addition to testing the waters of Dodd-Frank, it introduced a new way of establishing intent—of testing reality—within the increasingly electronic marketplaces of the American financial system. As economist John Montgomery commented (2016),

the recent enforcement and criminal cases [against spoofing and market manipulation] generally involve allegations that orders submitted by the defendant induced changes in orders submitted by other traders. [...] *It would then fall to economic experts to analyze whether such a pattern exists, and whether the trading suggests an intention on the part of the defendant to induce the other limit orders to be submitted.* The pattern

described could be consistent with benign activity as well. For example, the trader could have orders on both sides of the market to benefit from the spread. A more aggressive trader could enter and submit more aggressive orders that then interact with the other side of the defendant's orders. Seeing those more aggressive orders, the defendant concludes the market is moving, cancels his/her open orders, and submits orders on both sides of the new market price. If a trader is alleged to have pursued spoofing as a strategy, *an analysis of the risk and expected return of the strategy can provide evidence on whether this is a plausible claim* (emphasis added).

There is, then, a reality test: if economic experts find risk-adjusted returns abnormal within the context of a particular order book design, something must be amiss. The result of such logic, argues Steven McNamara, is that *US v. Coscia* “takes the natural step of inferring a second-order intent in the programming of algorithms to accomplish certain tasks” (McNamara 2016). In this, the material cultures of electronic financial markets may not only be cultures of second-order-transparency, as Muniesa (2014) pointedly observes. It is also possible that, following *Coscia*, intentionality within the market is now observable only from a distance, through the judgment of experts that discern the boundaries of actions by discriminating between true and false transactions, real and fictitious market relations, according to how they are positioned within the order book. But this might not be too surprising, after all: relations are, at the end, artifacts of knowledge and craft.

Some final thoughts

That infrastructures matter in configuring relations, that they create and shape the communities that exist above them, can be seen perhaps by looking at the past as much as at the present. Consider, in particular, the trading floor, an infrastructure that contrasts sharply with the logic of the order book. Whereas order books operate under strictly symmetrical rules of price-time priority, trading floors are spaces of slightly more asymmetric interaction. Order books are organized as queues of electronic messages; trading floors take the shape of

crowds of traders. Order books are mostly anonymous; the dynamics of trading floors are characterized by interpersonal knowledge and communication (Zaloom 2006, Hertz 1998). Yet spoofing is native to both, receiving quite different treatments across each setting. In the digital domains of electronic limit order books, spoofing is, quite clearly, an illegitimate transaction, a false relation that threatens the moral standing of the anonymous market. In trading floors, however, spoofing was at times tolerated, sort of a joking relation (Mauss 2013) through which traders on the floor teased and tested their market-kin.

One example jumps to mind: a case of spoofing on the floor of the London Stock Exchange in the early 1980s. Then, prices were mostly verbal, sometimes represented through whiteboards propped on the pitches of market makers on the trading floor. Over interview, a once young trainee at one of the most reputable market makers in London recalled how representations were used to drive prices in particular ways. The individual in question was assigned to work on the Australian mining book, which consisted of a list of mining shares selected and managed by a senior partner. As part of his research, the senior partner travelled to Australia to inspect facilities, talk with managers and engineers, visit brokers in Sydney and Melbourne, and buy shares for the firm's inventory. On an occasion during which the trainee was on the pitch, the partner had returned from Australia, bringing shares of a newly found mining company. The market, as the trainee recalled, was "a bit frothy", yet the price of gold was "really going through the roof". Before the market opened at 9:30, the senior partner introduced his new finding to the firm's members and trainees in the pitch: "Alright. I've got this company called GEM Exploration, which I've bought 250,000 shares of [...] and I've bought them for the equivalent price of 3p. [We'll] see what we can do with them". So he wrote 'GEM' on the whiteboard and next to it he wrote '5' as the opening price for the share. Because it was written rather than printed on the board, it was clear for everyone in the market that this was a new share. And so, the first brokers were drawn to it. The first one to enquire about this strange new entry said "I see... What's this GEM you've got up there? They look interesting. Tell me about that". As the one responsible for managing Australian mining shares, the senior partner replied: "Well, I went to Australia. I

saw this company' and after explaining the business of the company, he mentioned he thought they were 'a real prospect in the current market conditions'. Intrigued, the broker asked for a quote. "They're 4 6" replied the senior partner. "What sized you'd like that?" asked the broker. "25,000" answered the market maker. "OK, well, thanks very much. I'll go away and have a think about that one", said the broker as he walked away from the pitch. Regardless of the fact that there had not been a transaction, the senior partner changed the price on the whiteboard, writing in blue the number 6. The next broker approached the pitch, seeing GEM Exploration on the board.

'What are they this morning?' 'Ah, well they're 5 7'. 'What's the size?' 'Ah, well they're at bid for 25, offered in 10'. Which showed that I'm a buyer, obviously. And he said 'Oh, OK, well, I'll buy ten'. The next guy comes along and literally, within half an hour, the things are trading at 25p. By the end of the day, they're trading at 40p, and we've turned over 2.5 million and we are we are long 350,000 shares instead of 250,000 shares (Interview with former market maker).

The case was blatantly one of market manipulation: the representation of prices on whiteboards was meant to elicit, like Coscia's orders, reactions within the market community. But any similarities obscure an important difference: these types of manipulations on the floor, although certainly contested, had an altogether different moral valence. To manipulate one's relative is one thing; to manipulate a stranger in an anonymous environment is quite another. Those were the days of the floor. As Gregory Meyer of the *Financial Times* wrote, technology "changes the nature of violations". But if it does so, it is necessarily because different technologies imply and enact different "mutualities of being" (Carsten 2013). The risk of spoofing is a risk of false, rather than joking, relations—a challenge to the legitimacy, morality and sense of reality of modern markets (Arnuk and Saluzzi 2012).

So what do we gain by looking at infrastructures? Firstly, they suggest focusing on relations and the mechanisms that bound, format and enact them and their social worlds. The market is, indeed, an arms-length setting: agents in financial markets today, for instance, have an ease of exit that is quite

unparalleled historically. Yet markets are also bound by connections, mutual dependencies, and reciprocal obligations—materialized through settlement systems, contractual linkages, and connectivity standards, but also through associations, professions, employment matching patterns, and others. (As Turco and Zuckerman (2014) show, exit is indeed quite limited, even in the putatively rational and calculative spheres of private equity.)

Second, if relations emerge in connection to infrastructures, then the politics of relations cannot be contained within the catagoremes of social actors and their mobilization. Relational economic sociology, like broader relational approaches, stresses the unequal distribution of power and resources as shaping categorical (and thus relational) work. This is certainly part of the story—but what an infrastructural inversion would advise is looking further than front-stage struggles. Definitional battles over spoofing were surely shaped by overt institutional politics, for example (see Arnoldi 2015); but practical instances of spoofing depended on an altogether different articulation of intent on the basis of overlapping (yet disparate) forms of knowledge and expertise. Spoofing was not the object of ideological intervention—rather, it was at best a boundary object (Star and Griesemer 1996), linking the different ecologies of trading platform designers, lawyers, market microstructure economists, regulators, and a mixed gamut of market participants.

Third, infrastructures compel us to think of the ‘invisible’. The question of spoofing is unescapably linked to issues about the nature of order books and the implicit assumptions they make about how things can (and should) be meaningfully connected. To understand how reality was realized in finance, how specific modes of action emerged as second nature to market participants, how categories were drawn in the marketplace, requires tracing the histories of these invisible platforms and their multiple makers. For contemporary financial markets, so it seems, reality is partly manufactured by the invisible hands of others.

References

Arnoldi, Jakob. "Computer algorithms, market manipulation and the institutionalization of high frequency trading." *Theory, Culture & Society* (2015): 0263276414566642.

Aldous, J.(1972). An exchange between Durkheim and Tonnies on the nature of social relations, with an introduction by Joan Aldous. *American Journal of Sociology*, 77(6), 1191-1200.

Arnuk, S., & Saluzzi, J. (2012). *Broken markets: How high frequency trading and predatory practices on Wall Street are destroying investor confidence and your portfolio*. FT Press.

Balarkas, R. and Ewen, G., "Algorithms to Help you Trade Aggressively", *Algorithmic Trading*, Second Edition, 2007, pp. 1-10

Bandelj, N. (2002). Embedded economies: Social relations as determinants of foreign direct investment in Central and Eastern Europe. *Social Forces*, 81(2), 411-444.

Bandelj, N. (2003, September). How method actors create character roles. In *Sociological forum* (Vol. 18, No. 3, pp. 387-416). Kluwer Academic Publishers-Plenum Publishers.

Bearman, P. (1997). Generalized exchange 1. *American Journal of Sociology*, 102(5), 1383-1415.

Beunza, D., & Stark, D. (2004). Tools of the trade: the socio-technology of arbitrage in a Wall Street trading room. *Industrial and corporate change*, 13(2), 369-400.

Biersack, A. (1982). The logic of misplaced concreteness: Paiela body counting and the nature of the primitive mind. *American Anthropologist*, 811-829.

Boltanski, L., & Thévenot, L. (1999). The sociology of critical capacity. *European journal of social theory*, 2(3), 359-377.

- Bourdieu, P. (1977). *Outline of a Theory of Practice* (Vol. 16). Cambridge university press.
- Bourdieu, P. (2005). *The social structures of the economy*. Polity.
- Bowker, G. C., Baker, K., Millerand, F., & Ribes, D. (2009). Toward information infrastructure studies: Ways of knowing in a networked environment. In *International handbook of internet research* (pp. 97-117). Springer Netherlands.
- Bowker, G. C., & Star, S. L. (2000). *Sorting things out: Classification and its consequences*. MIT press.
- Carsten, J. (2013). What kinship does—and how. *HAU: Journal of Ethnographic Theory*, 3(2), 245-51.
- Chordia, T., Goyal, A., Lehmann, B. N., & Saar, G. (2013). High-frequency trading. *Journal of Financial Markets*, 16(4), 637-645.
- Coleman, M. (1995). Gestation, Intent, and the Seed: Defining Motherhood in the Era of Assisted Human Reproduction. *Cardozo L. Rev.*, 17, 497.
- Dewey, J. (1939). *Theory of valuation*. International encyclopedia of unified science. Chicago University Press: Chicago.
- Durkheim, E. (2014). *The rules of sociological method: and selected texts on sociology and its method*. Simon and Schuster.
- Edwards, P. N. (2010). *A vast machine: Computer models, climate data, and the politics of global warming*. MIT Press.
- Emirbayer, M. (1997). Manifesto for a relational sociology 1. *American journal of sociology*, 103(2), 281-317.
- Erikson, E. (2013). Formalist and relationalist theory in social network analysis. *Sociological Theory*, 31(3), 219-242.
- Federal Register, May 28, 2013, 78(102)
- Financial Times (2014). Available at:
<http://www.ft.com/intl/cms/s/0/7b9ccde8-638c-11e5-9846-de406ccb37f2.html>

Fligstein, N. (2002). *The architecture of markets: An economic sociology of twenty-first-century capitalist societies*. Princeton University Press.

Fourcade, M., & Healy, K. (2013). Classification situations: Life-chances in the neoliberal era. *Accounting, Organizations and Society*, 38(8), 559-572.

Goffman, E. (1978). *The presentation of self in everyday life* (p. 56). Harmondsworth.

Hennings, P. (2014) High frequency trading falls in the cracks of criminal laws. New York Times April 7, 2014. At: <http://dealbook.nytimes.com/2014/04/07/high-frequency-trading-falls-in-the-cracks-of-criminal-laws/>

Hertz, E. (1998). *The trading crowd: An ethnography of the Shanghai stock market*. Cambridge University Press.

Mackintosh, P. (2014) Demystifying order types. *KCG Working Paper*. KCG: New York.

Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The journal of Finance*, 25(2), 383-417.

Mauss, M. (1997). Gift, gift. *The Logic of the Gift: toward an Ethic of Generosity*, 28-32.

Mauss, M. (2013). Joking relations. Translated and introduced by Jane I. Guyer. *HAU: Journal of Ethnographic Theory*, 3(2), 317-34.

McNamara, s. (2016). United States v. Coscia as a Case of First Impression. *The CLS Blue Sky Blog*
http://clsbluesky.law.columbia.edu/2016/01/06/united-states-v-coscia-as-a-case-of-first-impression/#_ftnref14

Muniesa, F. (2014). *The provoked economy: Economic reality and the performative turn*. Routledge.

Muniesa, F., Millo, Y., & Callon, M. (2007). An introduction to market devices. *The sociological review*, 55(s2), 1-12.

de La Pradelle, M. (2006). *Market day in Provence*. University of Chicago Press.

Schneider, D. M. (1980). *American kinship: A cultural account*. University of Chicago Press.

Shalev, C. (1998). Halakha and Patriarchal Motherhood-An Anatomy of the New Israeli Surrogacy Law. *Isr. L. Rev.*, 32, 51.

Simmel, G., & Hughes, E. C. (1949). The sociology of sociability. *American journal of sociology*, 254-261.

Simmel, G. (1950). The stranger. *The Sociology of Georg Simmel*, 402, 408.

Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, translations and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social studies of science*, 19(3), 387-420.

Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information systems research*, 7(1), 111-134.

Strathern, M. (1995). *The relation: issues in complexity and scale*. Cambridge: Prickly Pear Press.

Strathern, M. (2005). *Kinship, law and the unexpected: relatives are always a surprise*. Cambridge University Press.

Swidler, A. (1986). Culture in action: Symbols and strategies. *American sociological review*, 273-286.

Thévenot, L. (2007). The plurality of cognitive formats and engagements moving between the familiar and the public. *European journal of social theory*, 10(3), 409-423.

Tilly, C. (1999). *Durable inequality*. Univ of California Press.

Turco, C. J., & Zuckerman, E. W. (2014). So You Think You Can Dance? Lessons from the US Private Equity Bubble. *Sociological Science*, 1, 81-101.

Wall Street Journal. (2014) Schwab on HFT: Growing Cancer that Must be Addressed. Wall Street Journal, April 3, 2014. <http://blogs.wsj.com/moneybeat/2014/04/03/schwab-on-hft-growing-cancer-that-must-be-addressed/>

Vargha, Z. (2011). From long-term savings to instant mortgages: financial demonstration and the role of interaction in markets. *Organization*, 18(2), 215-235.

- Wald, D. H. (2006). Parentage Puzzle: The Interplay between Genetics, Procreative Intent, and Parental Conduct in Determining Legal Parentage, *The Am. UJ Gender Soc. Pol'y & L.*, 15, 379.
- Weber, M. (1978). *Economy and society: An outline of interpretive sociology*. Univ of California Press.
- Wherry, F. F. (2016). Relational accounting: A cultural approach. *American Journal of Cultural Sociology*.
- White, H. C. (1992). *Identity and control: A structural theory of social action*. Princeton University Press.
- Zaloom, Caitlin. *Out of the pits: Traders and technology from Chicago to London*. University of Chicago Press, 2006.
- Zelizer, V. A. (2000). The purchase of intimacy. *Law & Social Inquiry*, 25(3), 817-848.
- Zelizer, V. A. (2009). *The Purchase of Intimacy*. Princeton University Press.
- Zelizer, V., & Tilly, C. (2006). Relations and categories. *The psychology of learning and motivation*, 47, 1-31.

¹ As explored by MacKenzie (2014), the main trading systems for the foreign exchange market (for instance, the Electronic Broker Service) were designed to run at slightly slower execution speeds than their equivalents in stock markets. It is thus entirely possible that the most liquid stocks in mature markets may trade at higher speeds than their equivalents in foreign exchange.