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Inhabiting Technology: The Global Lifeform of Financial Markets

21st-Century Techno-Lifeforms: Institutional Currency Trading

What will 21st-century global social forms be like? In this article, we focus on the 'candidate system': this emerged in the late 1970s from the world of nation states, a world from which it has disembedded but on whose existence it thrives, foreshadowing things to come in other areas (though the lifeform may also simply disappear under certain regulatory circumstances). In the 1970s, first the USA (1971), then major European countries, including Britain by 1979, and finally Japan in the early 1980s, abolished exchange controls, effectively eliminating the Bretton Woods Agreement of fixed exchange rates in place since 1944 and allowing foreign exchange trading for purposes of speculation. In 1986, Hamilton and Biggart (1993) observed that the dealing rooms of the world had taken off, with an average of US$150 billion and as much as $250 billion being traded around the globe, double the volume of five years before. In April 1998, according to the Bank for International Settlements' latest Triennial Survey, the average daily turnover in traditional global foreign exchange instruments had risen from $36.4 billion in 1974 to $1.5 trillion (BIS, 1998). Two-thirds of this volume derives from 'over the counter' transactions, i.e. from inter-dealer transactions in a global banking network of institutions. Banks had responded quickly to the business opportunities which arose with the freedom of capital that the breakdown of the Bretton Woods system initiated. They also responded to an increasing demand stimulated by volatile exchange and interest rates reflecting various crises (e.g. the energy crisis of 1974) and to the tremendous growth in pension fund and other institutional holdings that needed to be invested.

This little story of growth in institutional currency transactions serves as

where firms become flatter, rely more on teamwork and less on elaborate hierarchies, split up into independent business units, and adopt outsourcing arrangements - with the effect that horizontal connections within and between firms not only supplement but supplant vertical clustering and connections. The changes pertain as much to intra-firm principles of group formation as to a firm's governance structure and inter-firm relations.

The notion which covers it all is 'network'. If social scientists were infatuated with the concepts of bureaucracy and hierarchy in the past, they are now infatuated with the ideas of network and connectivity. For illustrations, consider Powell et al. (1996), who describe the rise of lateral, task-based networks within firms and the collaborative networks between them in the area of biotechnology companies; Stark (1996), who identifies and analyzes informal networks of cooperating firms throughout Eastern Europe; Hamilton and Biggart (1993) and Gerlach (1992), who describe social organization and change in Japanese, Korean, and Chinese businesses in terms of different kinds of alliances and networks; and DiMaggio (2001), where various studies are collected.

In many ways, the infatuation appears warranted. As an organizing concept, the notion of a network draws on a powerful convergence of organizational changes, technological developments, and broader cultural transformations which also sustain the character of the network concept as a model and advertisement for *how* business in any area *should be* conducted. The most important convergent development that contributes to network concepts is surely that of information and communication technologies which are based on electronic linkages between geographic areas and are referred to in terms of a vocabulary of nets, webs, circuits, and nodes. These have strengthened pre-existing trends toward network forms of organizations and facilitated some of these developments. Castells accordingly writes of the network society where 'flows of messages and images between networks constitute the basic thread of our social structure' (1996: 476-7). He sees dominant functions organized in global information technology networks linked by these flows, while subordinate functions fragment, and people in local settings are increasingly segregated and disconnected from each other. If the assembly line factory was the epitome of enterprise in the 20th century, information technology may play a similar role in the 21st century, making it natural to think of any institutional arrangement in terms of networks (DiMaggio, 2001: 39–40).

Cultural factors seemingly also contribute to the popularity of the notion. An indication of this popularity is analysts' growing preference since the 1980s for viewing things *in* terms of networks also in areas where sudden transitions to network forms of organizations are not evident. One example of this trend is actor network theory in science and technology studies (e.g. Law and Hassard, 1999). Another example is the analysis of markets, which,

a backdrop for a different story, that of the emergence of a global lifeform that inhabits technology quite literally during waking hours, is distributed across the three major time zones, and is nonetheless centered in and on itself - the lifeform constituted by the respective currency markets and those participating in them. In this paper, we begin to develop an analysis of what it might mean for a particular technological system to be 'inhabited' by participants. We also address the world-like features of the intra- and interbank electronic dealing network that this system represents and the role of the screen where the network becomes centered. An important purpose of this paper is to contribute to the opening up of network notions of information and communication technology for the role of such centering.

The basic insight which motivates our argument is that notions of interactions and networks embracing all social domains give short shrift to the actual realization of the networks - as centered post-network spheres at odds with the idea of distantiated units or nodes connected only by business linkages and social relationships. Currency markets before 1980 were indeed effectively structured in terms of networks. Contemporary foreign exchange markets, however, are better understood as appresentation-based, globally centered platform or flow structures. The notion of technology as an external artifact or infrastructure for information exchange distracts from the world-constitutive role of a particular component of this technology, the screen, and the appresentational work of traders together with an economy of secondary information supply that create this world.

In the following, we first discuss network concepts in relation to recent developments in business and finance, and review the historical transition of foreign exchange markets from network markets to on-screen markets. We then turn to the world-like and flow features of these markets. We draw on Schutz to spell out how these features differ from those of the paramount reality of everyday life he analyzed, maintaining that the specific temporality, contextuality, and situatedness of the traders' screen world has to do with the 'technological' makeup of this world. The paper ends with a discussion of the transparency of on-screen markets as constitutive of their informational materiality.

Network Models

The network concept is an old one in sociology; its recent popular renaissance however is, arguably, rooted in existence, in the rapid changes affecting a multiplicity of organizational units and forms analyzed by sociologists. One such unit is the business firm; here change has been associated with a loosening of the organizational form, bureaucracy, that emerged in the wake of industrialization. The cultural transformation we witness today is one

galvanized by Granovetter and his notion of the embeddedness of economic action in networks of relationships (1985), is now dominated by network approaches. In fact, the dominant line of research in this area specializes in the analysis of inter-organizational ties, in effect joining organizational analysis and market analysis through the use of network approaches that look at the nature of the relationships and networks and how these affect labor, product, credit, and investment (e.g. Baker, 1990; Baker et al., 1998; DiMaggio and Louch, 1998; Uzzi, 1999). Network embeddedness is a theoretical notion that postulates the interdependence of economic things with social structure - research tries to fill in how economic activities are shaped by what flows through the relationships in which actors are engaged. This is to be distinguished from the view that firms reorganize themselves in the wake of broader cultural transformations.

Yet despite these convergences of opinion and social and economic developments, there remains a sense in which a concept as versatile as that of the network also has major limitations. Networks are sparse social structures, and it is difficult to see how they can incorporate the patterns of intense and dynamic interaction, the symbolic components, and other specificities that we observe in concrete domains. Furthermore, networks postulate and indeed require the distantiation between units and connections that span the distance. With the network imagery, it is the connections which carry most of the burden of explaining a social form. But the emphasis on ties, their character, and what flows through them leaves out the details of how the connections are implemented. These details matter in shaping the organizing process and social form, that is, in determining whether relational ties bear the burden of organizing or whether this burden is carried by other structures.

In the markets analyzed, information and communication technologies - as developed by news media into transaction systems - provide not only linkages, but project local interest, events, and activities onto a common symbolic space, that of computer screens. Like an array of crystals acting as lenses that collect light, focusing it on one point, the systems collect and focus activities, interests, and events on the surface of computer screens. The screens themselves are identically replicated in all connected institutions and trading floors, forming, as it were, one huge compound mirroring device and site. In more phenomenological language (Schutz, 1962: 294–305), the screen 'appresents' the market: it brings the territorially distant and invisible 'near' to participants, rendering it interactionally or response-present.

From Networks to the Screen

All this is best illustrated by a concrete case, the foreign exchange market, to which we will now turn. Consider first the trading room. About 200 traders

engaged in stock, bond, and currency trading worked on the floor in the global investment bank observed.[1] Traders in inter-bank currency are not brokers who mediate deals but rather market makers. They take their own 'positions' in the market in trying to gain from price differences while also offering trades to other market participants, thereby bringing liquidity to the market and sustaining it - if necessary, by trading against their own position. Foreign exchange deals through these channels start in the order of several hundred thousand dollars per transaction, going up to a hundred million dollars and more. The deals are made by investors, speculators, financial managers, central bankers, and others who want to profit from expected currency moves, or who need currencies to help them enter or exit transnational investments (e.g. in mergers and acquisitions). In doing deals, currency traders have a range of technology at their disposal; most conspicuously, each trader faces up to five computer screens, which display the market and serve to conduct trading. The screen is the medium for making deals via dealer-to-dealer real time contacts called 'conversations', or via the electronic broker, a system that indicates dealing interests and matches deals. The thickly layered screens provide the core of the market and most of the context. They come as close as one can get to delivering a stand-alone world that includes 'everything' for its existence and continuation: at the center, the actual dealing prices and incoming trading conversations; in a second circle the indicative prices, account information, and some news (depending on the current market story), with further headlines and commentaries providing a third layer of information.

The market has of course not always been on screen. The history of foreign exchange markets since the 1970s instantiates and exemplifies for other areas the transition from networks to central, compound space. Let us start again with the 1971 breakdown of the Bretton Woods Agreement, which had hitherto effectively fixed exchange rates. Before the breakdown, foreign exchange markets also existed: foreign exchange deals are cross-border exchanges of currencies. Such exchanges were born with the dawn of international trade, and persisted through all ages. But in the 30 years of the Bretton Woods Agreement, foreign exchange deals reflected by and large the real requirements of companies and others that needed foreign exchange to settle bills and pay for goods. When exchange controls were removed, currency trading itself became possible as a market where exchange reflected price movement anticipation. Traders, however, had no computers, and trading was a question of finding and negotiating this market, which lay hidden within geographical space.

A trading room, in the early beginnings, was a room with desks and phonelines and a calculating machine. It may also have had a central phone booth installed in the middle of the room, originally serving as a quiet place to take international phonecalls which, early on, still had to be ordered

through the phone company; only national calls could be dialed directly. A most important device was the 'ticker', the telex, which churned out '50 meters a day' of news headlines and price pointers, as a former participant put it. Activities on the floor centered around 'finding the market', that is finding out what the price of a currency was and who wanted to deal. In the following quote, a former chief of trading recalls how he continually chased after the market:

> P: (...) So you had to constantly find out what the rates were in countries.
>
> KK: And you did this by calling up banks ?
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> P: By, yes. And there were also calls on the telex by other banks who either wanted to trade or wanted to know, simply wanted to know where dollar-Swiss was.
>
> KK: (...)
>
> P: Yes, you were a broker for traders, every morning you had to fetch all the prices in Europe, Danish crowns, Swedish crowns, Norwegian crowns, and such, national currencies every morning, the opening rates. You gave them to traders, they calculated them in Swiss francs, and wrote them down on big sheets.
>
> B: And you offered two-way prices already?
>
> P: (...) In Swiss banks exchange rates were determined by negotiation, like in a bazaar (etc.).

If appresentation is the transport of details from different geographical locations and time zones to a particular domain of activities, then a partial attempt at appresenting markets occurred before the introduction of screens: the prices written down by hand on the 'big sheets' to which P. refers in the above quote were displayed on wall boards and can be seen as early attempts at market appresentation. When screens appeared, they were at first no more than substitutes for the 'big sheets': displays on which the handwritten price sheets put together by female clerks were projected on the basis of pictures taken of the sheets on the floor. This form of appresentation rested upon a chain of activities that was in important respects indistinguishable from the one that fetched prices in pre-screen times: it involved narrowing down where the market might be by calling up or telexing banks, writing down the responses by hand (and perhaps recalculating prices in national currencies), and making this information available for internal purposes through a form of central presentation.

Screens began to 'appresent' a dispersed and dissociated matrix of interests more directly only in 1973, when the British news provider Reuters first launched the computerized foreign exchange system 'Monitor', which became the basis for this electronic market. Monitor still appresented the market only partially, however, since it, too, only provided indicative prices.

It did, however, from the beginning include news. Actual dealing remained extraneous to screen activities and was conducted over the phone and telex until 1981, when dealing services also developed by Reuters went live (Read, 1992: 283ff.). Yet from the beginning, Monitor radically changed one aspect of dealing: it answered the question of *where the market was*, i.e. what the prices of currencies were and who might be ready to deal.

Before the market-on-screen, prices differed between places and had to be ascertained afresh for every deal through long and painful processes of phoning up banks and waiting for lines from operators for overseas calls. After the introduction of Monitor, prices suddenly became available globally to everyone connected by the system, in a market that functioned between countries and between continents. Before the market-on-screen, there were dispersed networks of trading parties entertaining business relationships. After the introduction of the computerized screen quotes, 'the market' no longer resided in a network of many places, but only in one, the screen, which could be represented identically in all places. It acquired a presence and profile of its own, and its own temporal and other properties. The economic equivalent of this coming together of all market fragments in one location was the declining importance of arbitrage. Price differences between locations made visible on screen, even if they involve only indicative prices, will quickly be eliminated, as the information about them is available to all traders connected and traders try to take advantage of these differences.

The Rollout World of the Screen and How Traders Inhabit It

We now want to focus on the screen reality more directly, asking what it means for it to be a 'world' and for traders to inhabit this world. A starting point for the discussion can perhaps be the inclusiveness of the various app-resentations. The upshot of what was said in the last section is that the electronic programs and circuits which underlie the new screen market assembled and implemented in one site the previously dispersed activities, times, and situations of different agents; of brokers and bookkeepers, of market-makers (traders) and analysts, of researchers and news agents. The activities of these agents also served to assemble the states of distant national economies and policies and other economically relevant events, as well as records of the past and predictions for the future on screen. It is in this sense that the screen is not simply a 'medium' for the transmission of messages and information. It is *a building site on which a whole economic and epistemological world is erected.* The world-character of this site also comes about through the performative possibilities of the dealing systems implemented on screen. Nearly all deals in institutional currency trading today are made on screen; in

addition, the screen can be 'walked' and new windows opened up, giving the impression of inexhaustible depth and of richness of experience.

In social science literature it is not easy to find criteria by which to decide when we should count something as a world in its own right. However, we may perhaps draw on Schutz's phenomenological description of the paramount reality of everyday life and his structure of the lifeworld as the backdrop against which to inspect the screen world. For Schutz, the experience of the world of everyday life has the following features: a specific tension of consciousness, namely wide-awakeness, the suspension of doubt, intentionality geared to the outer world, a specific form of self-experience, that of the working self as the total self, a specific form of sociality – the common intersubjective world of communication and social action - and a specific time perspective, which he called standard time (1962: 229-30). Schutz was concerned here with the world of work, and the features he lists undoubtedly obtain as much in on-screen trading as in any other working context. Yet we should also be interested in the specific elaboration given to some of these features when a world of work moves on screen. In other words, the characterization one is looking for should allow for a technological habitat to generate its own patterning within an overall structure of experience. We would suggest that most of Schutz's world-features are specifically elaborated in on-screen trading. To illustrate, we focus on how his wide-awakeness, intentionality, and temporality reflect this specific patterning.

When explaining wide-awakeness, Schutz described a 'full attention to life and its requirements' as the working self 'traces out that segment of the world which is pragmatically relevant' and the relevant context determines the form and content of the subject's thought (1962: 212–14). In the present context, it is important to note that the 'requirements' of traders' on-screen world imply not only a full attention to life but a particular focusing and heightening of experience, often described as a form of arousal and stimulation that is much more than simple wide-awakeness. When traders arrive in the morning they strap themselves to their seats, figuratively speaking, they bring up their screens, and from then on their eyes will be glued to the *screens,* their visual regard captured by it even when they talk or shout to each other, and their body and the screen world melting together in what appears to be a total immersion in the action in which they take part. Traders often comment on the intensity of this experience. For example,

> I could be, I could have gotten three hours of sleep the night before, come on a train, deadbeat tired, I step on the floor ... and it's like, I don't drink coffee either, just zip, my adrenaline kicks in immediately ... I just call it electric. (cited in Levin, 1999: 58)

Traders have also commented on the accelerated social atmosphere which results from everything happening in exceptionally short time spans, and on

the continuity of the experience: 'you work, relax, eat, and literally sleep with the markets' (Schwager, 1992: 60). This deep engagement would seem to leave little room for the enjoyment of other, non-paramount realities described by Schutz, among which he listed the world of arts, religious experience, and dreams (1962: 231-59). The inhabitants of the screen world might be less successful than others in breaking through the walls of their province of reality and shifting the accent of reality to another one; even when dreaming, as one trader told us, he might be dreaming of the market. This 'stickiness' of the screen world may of course also have to do with the economic makeup of the respective markets. As Abolafia once said, 'the trading floor is not understood as a place to satisfice, footdrag or merely survive,' as in other work settings, 'it is a place to win' (1998: 10). But another source of the heightened tension imposed upon simple wide-awakeness may indeed lie in the computer screen and the temporal character of its world-presentations. Stone (1996: 36) argues that the narrower bandwidth of electronic com-munication where fewer signaling channels are available than in face-to-face interaction leads to a situation where the interpretative faculties of the person become more powerfully, even obsessively engaged in the effort to bring closure to a set of signals. Perhaps a more powerful engagement, with the interpretative fantasies opened up, translate not into the poorer experiential quality of screen worlds but into 'higher' experience and greater attraction.

We should emphasize, however, that we do not understand the screen reality we contrast in this paper with the geographically embedded network reality primarily in terms of technological hardware. Nor do we understand it mainly in terms of dealing systems and other software programs. Our focus is instead on the screen as a wired, programmed, and content-filled, textually elaborated *surface* that fascinates through its ability to frame and present a world. The microelectronic scaffold behind the surface should not be ignored, of course, nor should the secondary information supply economy that feeds the screen windows. Nonetheless, what interests us here is that all these feeding and sustaining factors converge on the screen, where they col-lectively give rise to its world-like features.

Now a second way in which these features depart from Schutzean world-characterizations: the temporality of the screen world. Time issues were already implied when traders talked of the continuity and inescapability of the market on screen, and they also arise in relation to the intersubjectivity of the screen world, which we have discussed elsewhere (Knorr Cetina and Bruegger, 2002a). Here we want to address how time is embedded in fundamental ways within the screen reality, and accounts for what we shall call the rollout-and-flow character of this world. Let us begin again with Schutz's notion of the world of everyday life as ruled by standard time. Schutz defined standard time as the intersection of what he called 'cosmic' time and inner time or 'dureV. Thus, in his account we experience our own

bodily movements as events happening in space-time - in the spatialized homogeneous time that is measured by clocks and other devices and within which physical events also occur. But simultaneously, we also experience these movements as changes in a continuous succession of an interconnected stream of consciousness, the one Schutz called, borrowing these notions from Bergson, 'durée'. Duree includes 'growing old' or becoming, and the stock of experiences changing continually by the emergence and 'sedimentation' of new experience. The notion of duree has to do with the phenomenon pinpointed by Bergson and Husserl in asserting that the lived presence endures - the past is incorporated into the present through recollections and reconstructions, and it also anticipates the future. When we work (Schutz had in mind physical actions), we experience our activities as events in inner and outer time, thereby unifying both time dimensions into a single flux.

All this would need greater specification, but here we will be discussing only one particular temporal characteristic of the screen world, its insidious, 'short' processual nature. Consider first that notions of reality and of a world tend to be spatial notions. Historically, the markets that now make up screen worlds were marketplaces, physical locations where buyers and sellers were able to meet and coordinate their interests. Likewise, our concepts of an everyday reality, including that of Schutz, tend to be spatial concepts. We see reality as an environment that exists independently of us and in which we dwell and perform daily activities. The very notions of 'inhabiting' and of a screen world as used so far in this paper also suggest spatiality; they suggest that the idea of a spatial environment can be extended to electronic realities as these become a 'habitat' for some of us. The problem with these notions is that they imply that time is something that passes in this spatial habitat but is extraneous to the habitat itself. We relate the existence of a habitat more to the physical materiality of a spatial world than to any temporal dimension. We also express, one assumes, the durability of the physical world compared with the human lifespan through spatializing world-notions. However, the screen reality discussed has none of this durability. It is more like a carpet of which small sections are rolled out in front of us. The carpet grounds experience; we can step on it, change our positioning on it. At the same time, we need to imagine the carpet composing itself as it is rolled out. Thus the screen reality - the carpet - is a process, but it is not simply like a river that flows in the sense of an identical mass of water transferring itself from one location to another. *Rather, it is processual in the sense of an infinite succession of non-identical matter projecting itself forward as changing screen.* This *is* what we call the flow-character and the rollout nature of this reality.

This understanding contrasts with common notions of flow which we should briefly consider. Analysts tend to associate flow either directly with (1) things traveling (through networks) or (2) with fluidity. The first idea responds to the increased mobilities of contemporary life. It gives expression

to the phenomenon that not only do people commute, travel, and migrate in seemingly ever-increasing volumes, but messages and information also move. It is particularly the traveling of communications that underpins the idea of a network society as one based on flows of information (e.g. Castells, 1996). Though this idea is important, it is confined to the transmission or transfer of things that remain by and large identical; but this is not what we have in mind with the notion of a temporally constituted screen world. The second idea, that of fluidity, draws on the distinction between liquids and solids. For example, analysts who emphasize fluidity conceptualize the current stage of modernity as marked by a transition from more solid forms of order and tradition to structures that are more liquid and fluid, or that are melting, as in Marx's famous phrase that 'all that is solid melts into air' (e.g. Berman, 1982; Bauman, 2000). The liberalization of traditional education exemplifies this trend, as does the deregulation of markets, the flexibilization of labor and the breakdown and replacement of traditional family relations (e.g. Lasch, 1978).

This idea of the 'melting of the solid' comes closer to what we are after, but the point we are making about screen reality is not that it is nomadic (without itinerary) and unmarked by the traces of social and economic structure. Our point is the projection and reconstitution of this reality as one that is continually emerging in a piecemeal fashion, like the environment that emerges in the headlights of a car at night and that reaches just a little bit ahead of the car. It is this short duration of the 'dwelling' and its emergence in episodic pieces contemporaneously with the inhabitant's activity of dwelling that the notion of a flow captures here.

We also suggest that it is possible to retain notions such as that of a world or of 'inhabiting' while remaining aware of the short time span and scrolling change of this particular dwelling. The screen that rolls out the lifeworld in which traders move nonetheless presents such a lifeworld; it presents a complex environment composed of 'walkable' regions and horizons that ground activities. The ground may be shifting continually and the lifeworld is 'in flight'. But traders are able to deal with this flux; their ways of 'inhabiting' are adapted to the lifeworld. An example of this adaptation is the traders' tendency to keep pace with their world in flight by following market movements in their trading, and by developing a 'feeling' for these movements. Traders also analyze the short-term and long-term tendencies of their lifeworld's movements in terms of stories and 'big pictures' that give them a certain permanence for a short time.

We now want to briefly address a third way in which the Schutzean world-features become refigured in the screen world studied. For Schutz and others, intentionality is the notion that best captures our orientation to the outer world in terms of projects and plans. We attend to life not only as 'wide-awake' beings, but we are geared to it through in-order-to-motives, through wanting to bring about projected states of affairs which we anticipate. This

is again a very general claim consistent with all worlds of work. The screen world, however, is one to which participants are not only oriented through projects and intentions but in which they are positioned. To enter this world and become part of it, a trader has to take a position in the market, meaning he or she has to have bought or sold currencies or other financial instruments.

As a consequence, traders see the market at any given moment from the perspective of someone who has interests, commitments, and investments. The immediate correlates of the 'positioned' nature of lifeworld participation in this area are 'exposures' and Vulnerabilities': traders have upside and downside exposures to market movements by virtue of being long or short on a currency from whose price direction they stand to lose money, and they are vulnerable to such losses. Positioning also translates into the emotions of 'greed' and 'fear' (all these are native terms) - the fear of losing and an avaricious appetite for making money Losses in particular are expressed in a vocabulary that resounds with emotions of felt violence and attack. As a trader on the Zurich floor put it, the terms refer 'basically (to) sex and violence and a lot of them seem to have to do with anal penetration'. The list we accumulated included T got shafted, I got bent over, I got blown up, I got raped, I got stuffed/the guy stuffed me, I got fucked, I got hammered, I got killed.'

This is a much more violent, emotional, and processual description than the one offered by Schutz. It brings in the body as an object of physical pain, even if the source of the pain is not physical. With this, the intentionality we started out with takes on a different flavor. If the entrance ticket to this world, the only way to be 'in the market' at all is to take a position, intentions will always be formed under threat of this potential pain, and they will be shaped by the consequences of already accomplished projects. If this is correct, then traders' ways of dwelling in this world should somehow reflect the experience of positioning and exposure. And they do. One interesting nuance of trading as a form of life is the attention traders pay to the emotional side of this lifeworld. Traders frequently and consistently speak of the need to manage emotions, they develop routines for dealing with these emotions, and they consider emotion management part of the expertise and savvy of professional trading (see also Schwager, 1992; Abolafia, 1996).

To sum up this section, let us say that we have characterized the 'world' features of the screen in terms of its inclusiveness, its specific temporal and 'rollout' character, and in terms of traders' positioned intensity of experience. To highlight the contrast with the Schutzean conception of a world we can speak of the 'shortened' flow of this world instead of standard time being experienced in it; of attraction and engrossment instead of wide-awakeness, and of responsiveness and structures of wanting instead of intentions.[2] We emphasize here again that these patterns have to do with the medium that is inhabited. Clearly, if the screen world is a flow-world then this has to do with

the technologies, the dealing systems and the feeds of content that make up this world and account for its step-by-step change. Traders acting on screen contribute to the flow through the specific time span of their activities and the text they add, but the time span and the information requirements are pre-given by the screen world. Engrossment and responsiveness result from the narrow framing and temporal 'shortness' of the electronic lifeworld, and from the existence of entrance conditions. We maintain that the network reality of earlier times where markets were not embodied on screen did not show this temporality and other features. We also believe that they resulted in similar engrossments only at certain moments, for example when markets were found and connected in arbitrage deals.

The Materiality of the Screen World: Informationality and Transparency

Using the notion 'world' necessarily leads to the question of what kind of materiality a system which we call a world has. What this section intends to do in conclusion is to explore this materiality. What is the 'material' of a system that is located entirely in the symbolic space of an electronically mediated reality? And what kind of materiality is consistent with a world characterizable as a flow? The most literal answer to this question is that this materiality lies in text, in the multiplicity of written numbers, headlines, sentences, and messages that one finds on screen; and it is this textual character that we want to emphasize. It *is* consistent with the idea of flow if we understand the text as in the process of being written rather than as finished product. The notion of writing points to the activities of the news agencies and systems providers that sell, besides workstations and terminals, the subscriptions to the writing on screen. If we shine the analytic torch on these writings we bring into view a whole secondary economy engaged in world-making through hardware developments *and* writing.

But we can also aim deeper, trying for an understanding that takes into account the content of the writing. First, we must be careful to give sufficient weight to the fact that the central textual presentations of the screen are not delivered by agencies but by traders. Traders perform the market on screen through conversational and electronic broker deals, price quotes, and deal-related communications. The secondary economy only provides the electronic means for these interactions. Thus we can imagine the screen content to be divided into representations and performative elements, with the representational part consisting of formulations and assessments of economically relevant events and situations from all regions of the world.

Second, we need to appreciate the fact that the key element in the representational segment is not *truth* in the sense of durable facts whose solidity

derives from any confirmed correspondence with the world, but *news:* nearly instantaneous and relentless reports of relevant new events and situations. When we used the term appresentation rather than representation above to refer to screen content, we did so to indicate the loss of representational function implied when we move from truth to news; by using this term we also emphasized the geographical and temporal bridging accomplished. A third point to note is that not only the deal requests and screen conversations, but also the appresentations of distant events and situations, have the potential to stimulate market moves.

What all this means is that the content of the writings on screen is *information*. A deeper understanding of the materiality of the screen world reveals it to be informational. It is the information arrival process that continually 'shorts the flow' of this world, changing the world picture and inviting dealing and interpretation activities responding to the change.

Elsewhere we have illustrated in more detail how different screen contents and the deals themselves are information for traders (Knorr Cetina and Bruegger, 2002a). Here we want to add one further detail, which also brings into view the collectivity of the screen world. The materiality of the world described depends, we argue, on a transparency regime of information. Transparency here refers first and foremost to the 'see-through' quality of the screen world. It implies the ' witnessability' of ongoing activities and events across geographic areas within the internal trading communities of global investment banks and within markets dealing in a particular instrument (e.g. within spot or options trading). The extent of this witnessability must be appreciated. If, for example, in the price-finding process for an option deal the Zurich trading desk discusses the option with London, the bank's other option desks worldwide listen in on these conversations:

> KK: They listen (to these conversations)? They can (see them)?
>
> SJ: (...) When you discuss something via the direct line with London then everyone worldwide hears it, which means, everyone can join the conversation. Just generally, they can join. If you have some relevant information, which the other two who discuss something don't have, then this information gets added (to the discussion), and (you say), hey, I heard about (this) ... (etc.). (Head of options trading)

Certain kinds of information can better be assessed locally, traders think, from contacts, briefings, reading the local news and from local observations. What the Ministry of Finance in Japan has on its mind is easier to assess, traders think, in Tokyo than in Zurich. In the case studied, these observations did not 'sediment' in the local trading center and become the implicit knowledge of a place, or of individual traders. They were also made globally available through banks' internal bulletin boards, another component of the transparency regime described. Bulletin boards are shared electronic forums

on which participants at various trading centers enter short, confidential observations:

> RD: The most sensitive information should go there, the least sensitive should go out to customer, or internal contacts. I mean *this is the holy grail!*

The advantage of bulletin boards, then, the boost they provide to transparency, is that they link distant trading places through the posted observations of what these places see locally, in their region of the world. But the advantage of bulletin boards also lies in the fact that supervisors, in watching market developments on such boards, become privy to traders' activities, and are able to judge them. On a more general level, supervisors can *'witness' the activities of traders as members of their organization* at the same time as they witness the market as it composes itself from traders' global activities. They can see not only the trading prices, other banks' indicative prices, the news and news analysis which are routinely displayed on screens, but also the trading conversations, information conversations, and electronic broker deals of floor traders.

This sort of transparency regime of information raises a number of (questions (see Knorr Cetina and Bruegger, 2001), but we can focus here only on how it contributes to the materiality of the screen world and on the difference this regime makes with respect to the network situation. First, the notion of the market as a lifeworld on screen becomes plausible only if there is sufficient 'stuff' to this lifeworld, and the volume and layers of information, i.e. material, on screen are proportional to transparency - to how much one can see from other areas in the screen's multiple reflectors. Transparency is also equivalent to witnessing and with traders acting as conduits of information. Participants who are oriented to and experience each other's 'stuff', mediated by transparency, will also experience a level of global coordination of consciousness that distinguishes this lifeworld from the more binary coordination of consciousness in network structures. Thus inhabiting the screen is not an individual or relational but a genuinely collective affair. Finally, the fact that the screen world is governed by a transparency regime of information also has direct economic effects. Economists address this contrast in terms of the increased market efficiency of these markets, by which they mean that excess profit opportunities are eliminated and prices become more reflective of the best available information (e.g. Bodie and Merton, 1995: 197).

Notes

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1 The study is based on ethnographic research conducted since 1997 on the trading floor of one major global investment bank in Zurich and in two other banks (see Knorr Cetina and Bruegger, 2002a for details).

2 See Knorr Cetina and Bruegger (2002b) for a more elaborate account of this wanting.

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