

Frankfurt School – Working Paper Series

No. 123

A Neurolinguistic Approach to Performativity in Economics

by Carsten Herrmann-Pillath

June 2009



**Frankfurt School of
Finance & Management**
Bankakademie | HfB

Sonnemannstr. 9–11 60314 Frankfurt an Main, Germany

Phone: +49 (0) 69 154 008 0 Fax: +49 (0) 69 154 008 728

Internet: www.frankfurt-school.de

Presented at the Annual Meeting of the *Ausschuß für Evolutorische Ökonomik* at the *Verein für Socialpolitik*, Jena, July 2-4, 2009

Abstract

In recent sociological studies of markets, especially financial markets, researchers have argued that economics is performative (MacKenzie, Callon et al.). By this they refer to the observation that theories such as the Black-Scholes formula do not simply describe reality, but contributed to the regulatory creation of financial markets in which the agents started to adopt behavioral patterns that correspond to the theory, also relying on artefacts that have been created by the originators of the theory. This notion of performativity fits also other recent uses of language theory in economics, such as the theory of organizational forms in organizational ecology (Carroll and Hannan) or John Searle's theory of institutions. The paper builds on this, especially Searle's approach, and explores the underlying cognitive operations. It is argued that performativity builds on the human capacity to generate new meanings from existing concepts. This is elaborated in the theory of conceptual blending that has been developed by Fauconnier and Turner. For example, blends are a typical phenomenon in the emergence of new business models, such as in the dotcom bubble. The theory of conceptual blending can be based on neuroscientific insights into the operations of the human brain, corresponding to Searle's proposal to ground institutions in neurophysiological dispositions.

Key words: Searle's theory of institutions, financial markets, emergence of novelty, conceptual blending, neural theory of metaphor

JEL classification: B41; D02; D87

ISSN: 14369753

Contact:

Prof. Dr. Carsten Herrmann-Pillath
Academic Director
East-West Centre of Business Studies
and Cultural Sciences
Frankfurt School of Finance & Management
Sonnemannstr. 9-11
60314 Frankfurt am Main
c.herrmann-pillath@frankfurt-school.de

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1 Introduction: The status of reality in economics

For many observers, the recent financial crisis is also a crisis of economics. There are more specific and more general criticisms of this kind, for example, relating with the failure of economics to predict the crisis, or with the need to include more behavioral parameters into the description of agents on financial markets. One of the most general criticism is that economics simply turned out to be wrong as a description of economic reality, such as, for example, in its treatment of the underlying stochastic structure of financial markets (Mandelbrot and Hudson, 2008).

I have qualms with such kind of criticism, because it does not really define what economic reality is. There is a clear difference between the stochastic structure of climate when it comes to agricultural economics, and the stochastic structure of financial markets. In the latter case, we deal with an artificial object that does not exist independently from human action and cognition. Stock markets are not apple trees. In the most simple fashion, we might say that a stock market is an institutional structure, which comes into existence via an act of institutional creation, e.g. by actions of lawmakers. In a more complex way, we could describe a stock market as the empirical phenomenon that arises from human actions taking place under that institutional framework, thus generating a wide variety of intended and unintended consequences. This empirical phenomenon manifests certain stochastic properties, which, as we have learned repeatedly, we do not fully understand. It is precisely our ignorance about the complex systems that human beings create that leads us to regard those as a reality that is independent from us, and which can be further investigated by means of objective methods in science.

In recent economic sociology, the notion of performativity has been proposed to deal analytically with this special kind of relation between human action and reality (for a survey, see Callon 2007). Performativity is a term borrowed from the philosophy of language. In a sense, in economics, this theoretical step reflects the transition from the theory of ideal formal languages to the analysis of ordinary language that was pushed by philosophers such as Wittgenstein and Austin in the 1950s of the last century (for a survey, see Lycan 1999). The situation

in economics is similar until today. In the past, economics focused on the development of ideal formal languages, such as general equilibrium theories, which were intended to work both in the normative and, somewhat awkwardly, in the positive sense. A general equilibrium theory is primarily intended to describe an ideal economy, which is a stripped-down version of real economies, and which is intended to work in a perfect way. At the same time, however, it is also regarded as a description of the essential core mechanism in real world economies, such as in the case of Computable GE models in econometrics. In a similar fashion, theories of the ideal language were explicitly designed to construct languages which do not manifest the many weaknesses and imperfections of natural languages. But at the same time, they were seen as building on logics, and this in turn was seen as an essential property also of human mind as a real world phenomenon.

The philosophy of ordinary language questioned all this and made a very simple point right at the beginning: This is to observe that natural languages do not only include sentences to which a truth value can be assigned, which were the exclusive focus on ideal languages. In contrast, one could even say that the majority of utterances in spoken human language are non-descriptive, such as giving orders, expressing sorrow, or giving a promise. This insight gave rise to many new approaches in the philosophy of language. One was speech act theory (overview in Green 2009). In this theory, there is an important class of utterances which are *performative*. This means, that the utterance creates a social fact, such as declaring a country independent or declaring a student to receive a degree.

Subsequently, I wish to analyze this notion of performativity in economics. In doing this, I go far beyond the current sociology of economics. In its context, the main interest is in understanding how the science of economics does actually perform the economy. This is now a well-researched, though contested field (for an important collection of papers, see MacKenzie et al. 2007). My perspective is different. I accept this approach in the sense that I presume that at least some theories in economics are performative. But I extend this notion to include performative statements in general, which might be involved in the creation of markets and economic systems. I do this by referring to John Searle's theory of institutions, thus merging two different strands of thinking, which, however, share a common reference point, as John Searle was also one of the major protagonists of speech act theory in the 1960s.

Having done this in the second section of the paper, I enact a shift towards cognitive science, which is the topic of the third section of the paper. This is because the notion of performativity needs to build on a particular cognitive capacity, in particular metaphor. This is easy to understand if one recognizes that a performative utterance normally implies to treat something as something else, such as two lovers as a married couple in the performative act of marriage.

Once this step towards the cognitive sciences is taken, doors are wide open to consider the possible role of the brain sciences in the theory of performativity. I go through this door in the fourth section, which is highly speculative. The question is whether we can identify a neuronal correlate to the theory of metaphor which has been outlined in section three. I think so, and I try to argue that we need such a neuroscientific counterpart to account for the phenomenon of creativity in performative acts. This leads to the conclusion that performativity is an aspect of economic reality in the sense of externalism. Externalism is a foundational position in the philosophy of mind which posits that mental processes are impossible to conceive without an essential connectedness between inner and outer processes, as far the boundaries of the mind/body are concerned. This corresponds to the sociological applications of the notion of distributed cognition in analyzing performativity (Hutchins 1995). The important conclusion is that economic reality can only be properly understood as a conjunction of brain processes and external structures, with institutions being the primordial example. I illustrate this with some observations on behavioral finance and the sociology of finance.

2 Performativity and the naturalistic approach to institutions

When we think of stock markets as real, this is by no means an innocuous statement, because in a strict sense, economists would not regard any item other than individuals as being the ultimate constituents of economic reality. Pure economic theory is reductionist in the sense that an institution would only be treated as a property of systems of interaction between human agents, which are driven by their choices, such that the existence of the institution would be entirely dependent on them. This thinking clearly runs against everyday life experience in

which we experience institutions as hard facts that we cannot change easily, and which we take for granted. This is also a reason why the use of the term vacillates between institution and organization, as many institutions also have organizational counterparts, such as in case of the law, the police and the courts. Yet, even many non-mainstream approaches to institutions tend to treat institutions as mere epiphenomena of what is primarily a phenomenon located within individuals, such as the cognitive models that reflect and support institutions (Aoki 2001; 2007).

2.1 Searle's theory of institutions

So, the question is whether institutions are a central piece of the ontology of economics, being a part of economic reality in the strict sense (compare Lawson 1997). The philosopher John Searle (1995; 2005) proposed a theory of institutions which allows systematizing the aforementioned everyday life experience, in a similar fashion as the move from ideal to ordinary language. It is explicitly based on the analysis of language, and simultaneously it advocates to state a social ontology, which is much richer than the one normally presumed by economists, albeit implicitly. This is what might be called a naturalistic approach to institutions (compare Bhaskar, 1989; on naturalism in general, see Papineau 2007).

Searle's theory builds on the fundamental distinction between observer-dependent and observer relative facts. A mountain is an example of the latter, a holy mountain an example of the former. The mountain exists independently from the human observer, whereas the feature of holiness essentially depends on this observer. That example also shows that at a closer look things can be really complicated, as we also distinguish between a hill and a mountain, such that even the identification of a mountain might be observer relative to a certain degree, as different observers might not share the same opinion about the demarcation between those two concepts.

An observer-dependent fact does only exist in terms of its relation with an observer. Yet, this does not simply mean that it is subjective. Firstly, the cognitive state in which I assign the status of holiness to a mountain is itself an observer independent fact, i.e. a state of the brain that exists independently from any kind of observer. Second, certain consequences that result from my treating the mountain as holy may also be observer independent, such as when I just

stop in front of it, thus changing the direction of my bodily actions. That means, even though an observer relative fact is also based on subjective states, because I myself know and feel what it means that the mountain is holy, yet the consequences are objective in the sense that they can be ascertained by other individuals, possibly even reaching a scientific consensus. This is precisely what happens with a stock market. A stock market is a highly subjective phenomenon in the sense that, for example, traders experience a wide variety of emotions and cognitive states related to it, and in a fundamental sense its driving forces, the expectations, are subjective, as it is very much emphasized by the Austrian tradition of economics. However, the stock market clearly also is accessible to objective knowledge, such as statistics and econometric research building on it. So, the stock market is both, it is observer relative, and it is a fact.

If we look for the central underlying causalities that result into observer relative facts, language is the prime mover. This is for two reasons. One is that language involves the essential function of representation, in the sense of something representing something else, and the rules how to construct and manipulate those representations. The holy mountain and the mountain are two totally different entities, which involves very intricate relations, in the sense that we can say language assigns the meaning of holiness to the physical mountain, but also in the sense that it is the mountain that represents the idea of holiness. That is, in language reality in its entirety is transformed into a system of signs that are related to every other sign via semantic connectedness. So we can say that language is a central medium of observer relativity. However, one should notice that observer relativity does not exclusively presuppose language in the strict sense. For example, the shape of a predator is a sign of the predator, and being a predator is not simply a property of the animal but only in the relation with another animal. This relation involves signs, but we would not say that this is language in the strict sense (for more on this, see Ben Jacob et al. 2006). Searle (1995: 121) has an extensive differentiation between different kinds of facts that deals with this point, but we cannot delve into the details here.

The second reason for the analytical primacy of language is that language is essentially social, following Wittgenstein's theorem on the impossibility of a private language (Wittgenstein 1958; overview of the debate in Candlish 2004). Meanings always relate to collectives of language users who follow the rules of language. This implies that language use is always based

on forms of collective intentionality, in the sense that if Ego utters a sentence, this implies a directedness of mind in terms of the relations with Alter, the intended meaning of the utterance and so forth, and that this only works if there is some pre-established joint understanding about precisely this directedness (for a psychobiological background on this, see Tomasello et al., 2005; Tomasello and Carpenter 2007). Wittgenstein's theorem implies that language use is only possible as based on collective intentionality. In most simple terms, the subject of language use is never an *I* but always and necessarily a *We*, in the most fundamental sense of meanings that necessarily have to be shared in order to enable successful communication. It is precisely this property of language that turns linguistic facts into observer relative facts in the ontological sense, as we experience language as something external to us, which we can manipulate and distort, yet precisely even in those actions we need to rely on accepted language uses.

Now, in Searle's theory of institutions the precise functioning of language can be formalized in the so-called status function. A status function has the form $\langle X \text{ counts as } Y \text{ in context } C \rangle$, thereby assigning a certain function to *Y*. Status functions presuppose collective intentionality, as in the case when a collective agrees to assign the function of money to a certain kind of pieces of paper. How this collective intentionality emerges, does not matter in our current context (for an extensive philosophical account, see Tuomela 1995). But it is important to notice that status functions, viewed in an evolutionary perspective, normally go back on some functions that are related with "brute facts" (Searle 1995: 55ff.). In the case of money, early forms of money may build on certain physical properties of certain metals, for example. The possibility to treat a piece of paper as money, results from the fact that the pertinent status function is embedded into an evolved complex system of complementary institutions. Thus, a gate may serve to block access to a private estate, but even the open gate does not imply that access is now permitted in terms of the underlying status function of the gate.

The pivotal role of status functions in a theory of institutions is evident if one considers the fact of recursivity which results from their linguistic nature (Ingram 2007: 33f.). Status functions can be combined and nested in an infinite way, in the same vein as language is infinitely creative. Thus, *Y* in context *C* can count as *Z* in context *C'*. This phenomenon of recursivity, for example, lies behind the evolution of kinds of money, such as giral accounts being treated as money, or behind the increasing complexity of asset types and derivatives in finan-

cial markets. Further, status functions are constitutive, that is, they go beyond the mere regulatory role of institutions, which is often overestimated in economics. For example, institutions governing money do not simply regulate the use of something that does already exist independent from those institutions. This is an especially important distinction when it comes to the analysis of the evolution of institutions. For example, fishing might be a primordial activity of human hunters, which they share in principle with other mammals, such as bears. In human groups, this activity might be regulated by institutions, which, for example, govern the right for the first catch, or the use of certain instruments and ways of fishing. In modern fishing, however, there is a further transition in the context of the governance of fish resources. One can argue that the activity of fishing is substantially transformed into a market that is superimposed as an artificial construct on the primordial activity, in a similar way as paper money supersedes the use of gold coins (Holm and Nielsen 2007). What is being fished is a right on a resource, but not the fish in the primary sense. In many other cases, and certainly in the case of financial markets, institutions are purely constitutive, as the underlying traded items do not exist independently from the institutions. This corresponds to the Wittgensteinian notion of the language game, that is, economic activities come into existence in the same way as the game of chess comes into existence with the rules, and not by the crafting of its figures.

The final ingredient of Searle's theory is the notion of power. One can say that the litmus test of an observer relative *fact* is causal power (compare Bhaskar 1989). Thus, inflating the money supply triggers a causal chain of events in the economy, which are objective. In most contexts, causal power in social interactions is related to the power of an agent to do something, and where the means are limited to constrain this action. Thus, if the judge judges me guilty, I have to live with the consequences. The judgment is the cause why I stay in prison now, beyond the mere physical actions of the police and the physical structure of the prison. This causal power is based on the power that is assigned to the judge via the pertinent status function which assigns this role to a particular individual. Ultimately, this sort of power is a form of deontic power, which flows out of the collectively-intentional acceptance of certain rights and obligations. More specifically, this is the so-called power creation operator, which has the form $\langle \text{We accept } (S \text{ has power}(S \text{ does } A)) \rangle$. So, if via a status function an entirely new object is created, e.g. a share that is traded on the stock market, this also comes with a certain

allocation of power to the owners of the shares, for example, in relation to the management of a public company.

This observation completes the sketch of Searle's theory. The upshot is that institutions are not simply mental phenomena, such as the coordinated beliefs in some game-theoretic conceptions of institutions which describe institutions as equilibria (Schotter 1982). In Searle's theory institutions are part and parcel of a social ontology that is partly independent from our beliefs, yet essentially refers to *Us*. The notion of performativity helps to clarify this intricate relation.

2.2 Performativity and the creation of economic reality

Searle's theory of institutions gives a clear account of why we consider institutional facts as facts in the ontological sense, i.e. as observer relative facts. Money is not simply a reflection of the beliefs and choices of agents. Money exists and the proof of its existence are its causal powers. An illuminating illustration of this fact is money illusion, which should not occur in an ideal economy of the general equilibrium sort (Shafir et al. 1997). Yet, money has autonomous causal powers, which might in turn be explained even by neuropsychological theories (Weber et al. 2009).

We can now relate these insights with the notion of performativity which plays a central role in the sociological literature. Clearly, uttering a status function for the first time is a performative speech act in the sense of creating a social fact. So, if an individual works as a judge, this goes back to the original act of nominating her as a judge, which includes a performative speech act, mostly spoken and written.

As I have mentioned in the introduction, performativity is mainly discussed in the context of economics as a science. This does not constrain the theoretical implications, as we can view economics just as a special dialect in language in general. There is an intricate debate over the question how far certain economic propositions are performative, and others are not. The bone of contention is whether economics just describes its object of research, the economy, or whether it also contributes to its very existence. I think that this debate is mainly related with previously mentioned transition between regulatory and constitutional institutions in Searle's

approach. Some economic institutions refer to activities that are partly independent from them, such as raising a pig (which can also be done in an entirely different setting, such as a religious ritual). Other economic institutions create activities that do not exist independently, such as trading stocks. Hence, economics will also play different roles when economists set up hypotheses about economic processes. There will be cases where the economic propositions merely describe a pre-existing economic process, and others, where economics is heavily involved in creating the very process that these hypotheses purportively describe. The notion of performativity is therefore substantially different from both the merely expressive or descriptive role of economics and its prescriptive role because both would presuppose a pre-existing process.

In order to make this point as neat as possible, I briefly consider the example of economic statistics. This also allows for the extension of the argument beyond economics in the narrow meaning, thus including all possibly pertinent status functions. That means, an economics based status function would be, for example, to treat the stock market as an efficient market in the sense of the standard model of finance. A broader sort of status function would include the pertinent laws, which are not a part of economics proper.

In the case of statistics, we might be justified in maintaining the strong assumption that this is the part of economics that allows direct access to economic reality, as it stands, independently from economics in most current practices. An example is agricultural statistics (Didier 2007). Even though this results into a complex conceptual transformation of the primary goods according to certain procedures of classification and counting, one still cannot really say that the underlying objects do not exist independently from the economic statistics. Hence, agricultural statistics seem to express the underlying economic reality, and does not perform it. Now, consider another vital statistics, which is unemployment. As it is well known from the difficulties in measuring unemployment in less-developed agricultural economies, the modern notion of unemployment is heavily influenced by the underlying institutional framework for the registration of the unemployed. Once economic theory adds to the picture, we realize that this is a case of the performative function of institutional actions and economics. This is evident from the distinction between voluntary and involuntary unemployment, and hence the fundamental difficulties to measure the true rate of unemployment unequivocally. This goes back to the underlying analytical framework of the market system. In a New Keynesian

framework, for example, there are many arguments that might explain why wages may be in constant disequilibrium states, and, in particular, why they might be downwardly rigid, such that the economy consistently fails to reach the equilibrium point. This has serious implications for the measurement of unemployment, because a wage rate above the equilibrium wage rate will increase the labor supply. This results into a fundamental identification problem in the measurement of unemployment (fig. 1): If unemployment is just the gap between labor supply and demand, the measured unemployment includes two different parts. One is the pure effect of the decline of the demand for labor, which measures up to the supposed equilibrium value of full employment, and the other is caused by the additional supply of labor, which would disappear in the equilibrium state. Thus, if the economy were treated as a GE system, in figure 1 the true volume of unemployment is just section *ab*, whereas the measured unemployment rate includes *bc*, hence unemployment which is voluntary, in the sense of a supply of labor that would not appear in the equilibrium state.

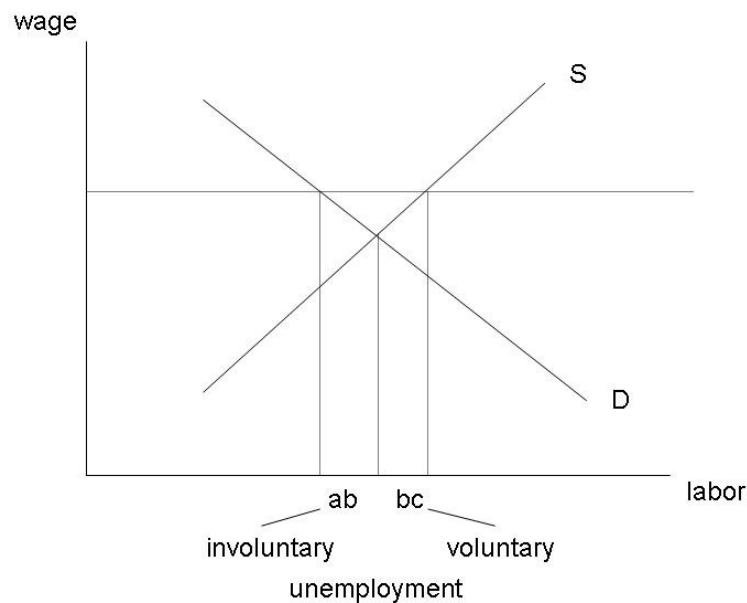


Figure 1: Performing unemployment in disequilibrium

In this example, we clearly have a transition from a mere regulatory institution to a constitutive institution: Unemployment may be seen as a fact that is independent from economics, but it is also straightforward to notice that it cannot be simply treated in the same way as a ton of

wheat in agriculture. In modern societies unemployment is a social fact that essentially depends on the institutional framework and we can also identify a possible performative role of economics. This shines up in the dependence of the statistical measure of true unemployment (involuntary unemployment) on the economic theory that is projected onto the economic processes. That is, all members of society could agree on performing the economy following the economic theory, which would entail a major redefinition of the employment statistics. As long as we stick to the current practice, the measure of unemployment also performs the economy in a particular way, thus including both voluntary and involuntary unemployment in its measure.

In the sociological debate, the most famous and extensively researched example of performativity in this sense is the evolution of financial markets and particular segments, such as derivatives trade (MacKenzie 2006, 2007). Again, we deal with a phenomenon that is reflected in raw data, such as prices of derivatives and volumes of trade. However, in this case the raw data play an important role also in determining the behavior of the economic agents, who need to build expectations about future values of assets. This is particularly crucial in option pricing. One of the central contributions to the modern theory of finance was the Black Scholes formula in option pricing that seemed to have solved the problem how to determine those prices, depending on certain expectations about the future value of the underlying assets.

The Black Scholes formula is a foremost example of performativity in economics because in the early years it certainly failed as a description of observed raw data on option pricing. So it did not really express or describe asset markets. However, with the emergence of that formula and other theories in modern finance, in particular the capital asset pricing model, it operated in a performative way in two different senses. One sense, and not only relating to this formula but to the entire body of the standard theory of finance, is that regulatory bodies increasingly accepted the theory, as well as agents on the markets, who pushed institutional and organizational innovations. This implied a convergence with the conditions of application inhering the theory, in particular, the most basic conception of a perfectly competitive market. Further, and specific the Black Scholes model, market agents started to use the formula as a device to detect deviations from the expected value and actual value in order to exploit arbitrage opportunities. Clearly, this introduced a sort of reflexivity in the institutional evolution, because this

way to build expectations created forces that indeed drove the option prices into the direction of the “right price“, as identified by the Black Scholes formula.

Although it is tempting to interpret this as a self-fulfilling prophecy, it is none, as the concept of counter performativity shows. The Black Scholes formula gained progressively in validity until the stock market crash of 1987. Afterwards, it was problematic and was modified substantially, which also broke the direct connection between the agents’ actions and the regularity described by the formula. The crucial issue, also significant in the context of the current financial crisis, was the underlying assumption about the shape of the statistical distribution underlying asset prices. The Black Scholes formula used a standard normal distribution. However, the much more frequent occurrence of rare events on the asset markets reveals that this is a misguided assumption. So, we do not have the case of a self-fulfilling prophecy here because the stochastic structure of the financial markets is not influenced by the way how the expectations are formed.

This does not undermine, however, the notion of performativity, but just to the opposite, it shows how performativity is indeed an aspect of a social ontology in which observer-independent and observer relative facts intermingle. Performativity does not mean that anything goes. There is a reality of economic systems which might even lead to the failure of performative acts. In speech act theory, this is called the conditions of felicity in linguistic communication.

To summarize, and pulling the two theoretical approaches together, we can say that performativity relates to actions underlying the collective expression of status functions in the economy. Once the Black Scholes formula started to diffuse among market agents, their actions converged on a particular kind of collective intentionality that involved a simultaneous innovation, namely the creation of markets for options, beginning in Chicago in the year 1973. However, presumably no market agents would just have believed that this market is only a matter of coordinated subjective beliefs. Instead, they accepted the reality of the market, for example, in terms of analyzing and responding to its volatility. Yet, the very property of volatility itself could not be measured atheoretically, that is, required the essential reference to the Black Scholes model. So, we have the clear cut case of a conjoint reality, essentially connecting between external facts and cognitive processes, and we can even say that particular cogni-

tive processes were also externalized to a substantial degree, as many traders would not really understand the theoretical content of the formula, but were relying on artefacts created by Black himself, i.e. calculatory devices that made the essential parameters for action directly accessible to the traders. Thus, the theory and the reality were just one complex construct that emerged from the status functions.

So, the notion of performativity provides the micro-foundation for the status function, i.e. relating collective phenomena with individual behavior. To complete that microfoundation, we need an alternative approach to rationality, which can be provided by cognitive science.

3 The cognitive foundations of performativity

I will now turn to the cognitive processes that underlie the status functions. The argument on performativity builds on a special linguistic function, which is the status function in Searle's terminology. This status function is a metaphor, in the most general sense, because it implies that a representative relation is established between two linguistic signs. We have already discussed this in the case of the example of the holy mountain. One cannot really say that the physical thing "mountain" is treated as holy, but in fact it is the linguistic sign for that physical thing that is given another meaning. Therefore we can say that the mountain represents holiness, or vice versa, that the holy mountain sign represents the mountain. In the count as formula, both Y and X are linguistic expressions, in the sense of representations.

In the recent two decades, in linguistics and in cognitive science the role of metaphors has been increasingly recognized as a central function of language (Lycan 1999; for a survey, see Pinker 2007). In computational models of language and thought, metaphors do not play any role, because the semantics is given, and there is a strong emphasis on syntax. Recently, this relation has been turned upside down, as some researchers now argue that the metaphorical function is foundational, and the syntactical function only secondary. One of the crucial arguments rests on the complexity of the notion of identity, which is taken for granted in computational models with even a tautological status ($A=A$), but is in fact a foundational issue in

semantics, which relies on networks of mutually dependent meanings, and where fuzzy boundaries of meanings and mutual definitions play a constitutive role.

One theory of that kind has been proposed by Fauconnier and Turner (2002). I concentrate on their approach as it is most straightforward to relate with performativity. Fauconnier and Turner argue that all cognitive processes build on *conceptual blending* and that the computational approach gets this fundamentally wrong. Conceptual blending occurs both in concept formation and in syntactical combination of concepts, as in linguistic utterances. This is not the place to delve into the very complicated and immensely rich field of linguistics and cognitive sciences here, where all this is, of course, the object of intensive debate (see e.g. Ritchie 2004). So I just treat their theory as one possible choice among competing theories which still await final evaluation, and which seems to make most sense in the context of our main topic. Therefore I leave the relation between syntax and conceptual blends aside, which is not directly relevant for our discussion.

A conceptual blend happens if two different concepts are projected onto a common frame of reference, such that a new concept emerges that manifests some, but not all features of the original concepts. Thus, conceptual evolution might be imagined to proceed from some most basic concepts to the more complex ones, even though this is only a merely analytical convenience, because for a certain set of concepts at a particular point of time, all concepts relate synchronically, independent from their presumed diachronic order of emergence. This is the reason why science can end up in totally different conceptualizations of fundamental concepts such as time, than purported in the original concepts.

There are different kinds of blends, with different degrees of structural complexity. All blends can be described as conceptual networks with directed relations. For example, a simplex network is just a projection of an abstract reference frame on a particular input space. The most interesting case is the double-scope network, which is also most relevant for our analysis of performativity. In a double-scope network, two input spaces are projected into a generic space, such that the blend does not retain all properties of the input spaces, that is, it emerges as a novelty not only as a concept, but also regarding the specific combination of manifest properties. Clearly, this allows for the construction of new blends if that first blend is then projected into other generic spaces with other inputs and so forth.

A standard example for this is the metaphor of *time as space*, which is briefly sketched in figure 2 (adapted from Fauconnier and Turner 2008). In the original input spaces, time is regarded as a linear sequence of events, which manifest a certain rhythm, such as the sequence of sunrise and sunset. Space is regarded as the medium of movements with large degrees of freedom in the directedness. The two input spaces can be projected into a generic space, which is motion. Motion is an abstract frame that combines action in space with the flow of time. Via this projection, conceptual blends become possible, which relate to particular kinds of motion, such as circular motion. Thus, the original linear sequence of sunset and sunrise can be seen as a circular motion, thus ending up with a concept of a day as a closed circle of movements of the sun. Once a day is conceptually defined, it can be projected into other generic spaces, such as rhythm, which allows for the division of a day into smaller segments of equal duration, and so forth.

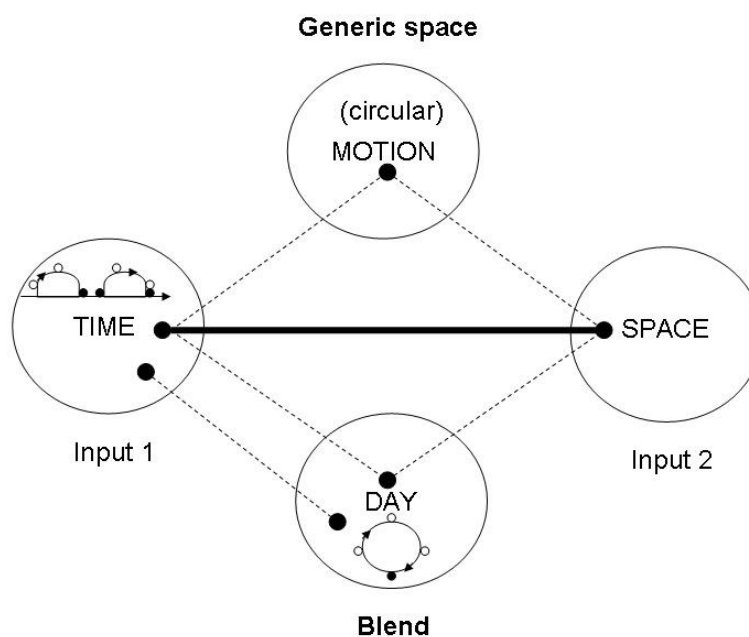


Figure 2: Time as space (modified after Fauconnier and Turner, 2002, 2008)

I posit that this kind of analysis helps to further dissect the status function in institutional emergence. Clearly, a status function must be based on the projection of two input concepts X

and Y onto a generic space, the context C, that allows for the emergence of the institution as a blend between the two. In this sense, Searle's approach is lacking an important part of the cognitive science story that is actually hidden in his notion of context. This is because in fact the context and the generic space cannot be simply the same. I come back on this in the next section. Let us just fix right now that the status function as such is the conceptual blend, in the sense of being an explicit description of the process of blending.

There is an excellent example in the sociological literature on performativity which allows specifying this internal semantic structure of a status function. This is the emergence of a foreign exchange futures market in Chicago in the early 1970, which prepared the institutional setting for the rapid growth of international forex exchanges after the demise of the Bretton Woods system (MacKenzie 2006: 143ff.) and was part of an across-the board liberalization and deregulation movement that ended up in the modern system of financial markets that ran into the crisis of legitimacy in fall 2008.

Futures did exist for long in the markets for agricultural commodities. Until the late 1960s, however, the institution of futures trading was not transferred to the forex market, corresponding to the general opinion of the time that financial markets tend to speculative disorders, and even markets in general, which also had rendered the agricultural futures markets dysfunctional because of widespread government intervention into the price mechanism. Obviously, there was a belief that between commodities and currencies there is a substantial difference, which would prohibit the transfer of concepts from agricultural markets to currencies. This difference was reflected in a frame competition, i.e. a vascillation between different generic spaces, as conceived in the Fauconnier and Turner approach (see fig. 3). One frame would be based on the abstract features of <agricultural futures markets>. A projection of both agricultural commodities and currencies on that generic space would have immediately allowed for a new blend of a <forex futures market>, that could have been translated into a corresponding institution. However, this blend was impossible to achieve because most actors believed that the proper generic space for that projection would have been <gambling>.

Actually, for the forex market only a simplex network held, which directly equated any kind of activity that does only involve money as gambling (for a detailed historical analysis, see Millo 2007). There was a strong belief that futures markets are only acceptable if the delivery

of final commodities actually takes place, that is settling accounts by netting out balances was not legal, because that would have opened the way for gambling activities. Since in purely monetary transactions netting out is a direct result for mere convenience, they were straightforwardly seen as gambling. The historical roots of this special frame projection lies at the turn of the 19th to the 20th century, when the Chicago Board of Trade launched a campaign against competitors which started to offer contracts over future prices of agricultural commodities, thus actually providing the opportunity to bet. The crucial argument against this business model was that delivery of commodities does not take place, so it was a purely monetary deal. As such, it fell under the accepted definition of gambling, which was enshrined into many state laws in the following decades. In fact, agricultural futures trade very soon did not imply actual delivery to a large extent, but that did not matter for the extension of that practice to purely financial transactions. What counted was the mere physical possibility of delivery, which was obviously even impossible for the case of index based derivatives and other financial innovations that later emerged in the 1970s.

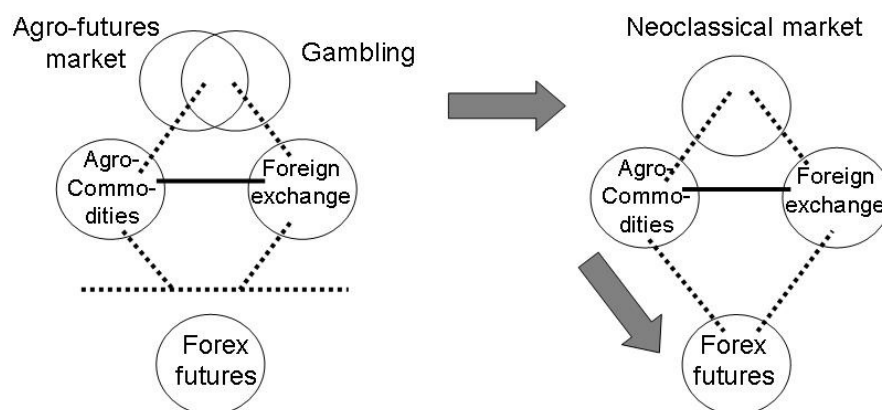


Fig. 3: The emergence of forex futures as frame competition

So, the emergence of forex futures markets as a new conceptual blend was blocked for many decades. This only changed in the late 1960s, mainly for two reasons. One is that a change of perspective on the issue of deliverability took place. Since in foreign exchange transactions the original denomination of the different currencies is maintained, one could argue that in

fact delivery happens at least in principle, in the shape of the different currencies in kind. Simultaneously, for other derivatives it was also recognized that actual delivery would even destabilize the markets, as actual transfers would affect the underlying asset prices, as in the case of index futures. The other reason was the increasing acceptance of the neoclassical equilibrium view of the forex market.

This second phenomenon is a clearcut example of performativity of economics. Whether the forex market actually follows the theoretical premises of equilibrium theory, is still an open issue today. But once it is accepted, the neoclassical theory works similar to the Black Scholes formula in the sense that orderly speculators will accept the theory and form their expectations according to it, ending up in a behavior that leads back to equilibrium. Historically, this transition to a new view of markets was directly pushed by some eminent economists of that time who also had a strong influence on regulators, in particular Milton Friedman.

As these examples show, performativity is not confined to economics, and this is why the extension of the approach via Searle's theory of institutions is worthwhile. The general point is that language manifests the property of ontological creativity, in the sense that language creates things, both in the sense that linguistic concepts are things, but also that these things are conjointly externalized with other things. The famous example in case of the Black Scholes formula are the spreadsheets that Black created for the convenient use of options traders who could overview with a glance the implied theoretical options prices without doing any calculations by themselves, or even understanding the formula. Thus, the adoption of the Black Scholes formula as a frame was also accompanied by the diffusion of artefacts that supported a reality of action emerging from the use of the formula.

I propose to generalize this in the way that linguistic artefacts play a central role in processing uncertainty on the marketplace, and in doing this, they also support the fixation of an open future, in the sense of ultimately co-determining the realization of one of the possible worlds. From that perspective, the concept of institution is also extended to include all forces on markets that lead towards the emergence of structures that systematically correlate concepts and material phenomena, such as technologies or firms as material arrangements of people, physical assets and flows of goods and services.

Thus, the approach of conceptual blending can also be used to provide a micro-foundation for the approach in organizational ecology which assigns a central role to “organizational forms” in the evolution of industries (Carroll and Hannan, 2000; Hsu and Hannan, 2005). Again, this can be seen in the larger context of Searle’s theory in the sense that, according to the organizational ecologists’ methodology, an organizational form relates to sets of audiences who observe, evaluate and communicate over organizations and industries. From that perspective, an organizational form, such as the notorious microbreweries, which are one of the work-horses of that literature, is in fact a part of a status function in which a certain population of firms is treated as representing an organizational form. When new business models emerge for the first time, as in the case of the dotcoms, there were still many uncertainties regarding the definition of the industries, the identification of the most characteristic business processes or the accepted patterns of organizational structure. This raised the uncertainty regarding the valuation of their stocks considerable, as we shall see below. Once an industry evolves, forms settle down, in the sense that there is an emergent implicit consensus in the pertinent audiences what the typical forms look like. Audiences include different circles, from government regulators over employees to customers. The form is very significant as it normally defines a default position, that is, once an organization has been identified as having the form, search for further information might be stopped, that is other properties are taken for granted (Hannan et al. 2007: 78ff.). Organizations that do not fit into the form will face much more difficulties in getting funding, increasing market shares etc. Thus, the form is a central piece in understanding market dynamics in terms of variation and selection.

Behind the emergence of forms, we can posit again the functioning of conceptual blends. This is straightforward to show if we focus on the level of single agents who actually utter the performative statements that coalesce into a collective status function. For example, the Fauconnier and Turner approach can be applied for all analytical schemes used on financial markets to predict the future, especially in the context of emerging new business models. Ehrig (2009), building on earlier work by Beunza, gives an account for the uses of frames in the work of analysts which also shows the working of conceptual blends (fig. 4). During the dotcom bubble, analysts faced the difficult task to present valuations of newly emerging business models for which no direct past experience was available. The new technologies allowed for business processes and forms of customer relations that did never exist before. In the field of finance,

this required a complex interaction with investors who might not be fully informed about those technologies. That is, again, we do not have a simple case of self-fulfilling prophecies here. No investor can just push a technology by amassing venture capital if there are objective reasons why ultimately the technology does not hold its promise. But at the same time, the technology can fail if the investors' expectations are not coordinated successfully, in spite of being feasible in principle. Analysts play an important role here. So we have another case of competing frames, in the specific sense of a competition among analysts who utter performative statements. Some of these statements ultimately prove to be true and become building blocks of the new organizational forms.

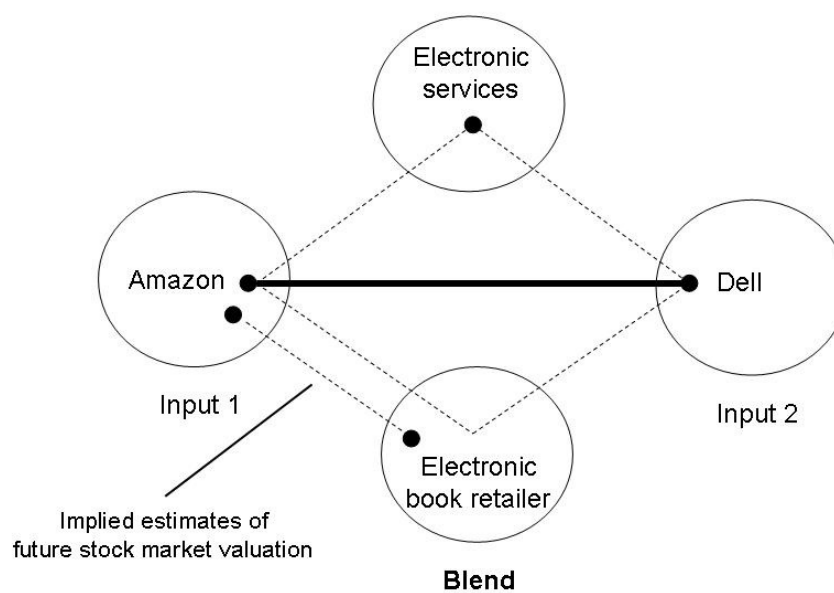


Figure 4: Performing a new business model: The case of Amazon (modified after Ehrig 2009)

Indeed, in the case of dotcoms, many analysts presented their arguments in terms of metaphors. In this case, analysts set up a frame in which the new business was compared with another, already existing form of business. For example, when Amazon entered the market, analysts were not able to assess its business model unequivocally. So a frame competition emerged on the market for financial advice. Some analysts compared Amazon with a book seller, others with existing new schemes of internet based distribution, such as Dell com-

puters. The resulting forecasts for future returns and hence stock value predictions were vastly different. The two frames were actually claiming two different kinds of reality. Once one had settled, actions between investors and entrepreneurs were coordinated successfully. This marks the emergence of a new, now generally accepted business model, the electronic book dealer.

Clearly, the form is another example for a status function, so that we can say that industries become institutionalized. In the organization ecology literature, there is also a strong emphasis on deontic aspects of forms, as they provide legitimacy for a wide range of business actions, and the assign specific sets of rights and obligations to market actors. Once a form of dotcoms was established, industries could be re-arranged and a new form of high-tech business was born. This also applies for the decline of organizations. For example, many analysts today agree on the decline of the newspaper. The newspaper is a clearly defined organizational form, with a specific kind of professional life, a relatively fixed product structure and a stable composition of readers. The newspaper is threatened by the new forms of news processing and presentation in the WWW. As we see again, performativity does not simply mean self-fulfilling prophecies, but relates on conditions of felicity, which might undergo fundamental changes for the case of newspapers.

To summarize, I have now demonstrated how performativity is based on a particular kind of cognitive functioning, which is conceptual blending. Much could be added to this, as conceptual blending is also supported by generalized cognitive functions. With regard to this aspect, there are already approaches also in institutional economics that can further undergird the analysis of performativity. This is especially true for certain psychological regularities of cognition, which, for example, have been systematized by Gestalt psychology (Schlicht 1998). The emergence of organizational forms, for example, will be supported by the tendency to impose consistency and clarity on the forms, thus adding a generalized creative function in the sense that still imperfect forms, once being recognized as emerging, will be autonomously perfected into complete schemes. This process contributes, amongst other aspects, to the creation of formalized definitions of forms. Fauconnier and Turner also propose that cognitive blends ultimately rely on neurophysiological process, about which some general hypotheses can be formulated. This is the final building block that we need to understand performativity.

4 A neurophilosophical perspective on performativity

I now turn to the more speculative part of this paper. So far we can state that language is central to the construction of economic reality, precisely because language is not just a mental phenomenon, but externalized in a community of language users. Language and other economic entities are deeply correlated, thus constituting what we perceive as everyday economic life. This perspective on language is the familiar one of the linguist, who clearly treats language as an *artefact*, including the correlation between that artefact and brain processes (Ingram 2007: 3ff.), but is so far rarely invoked by economists, who, if at all, tend to emphasize language as a purely mental phenomenon, and hence focus on the dimension of meaning, which in the next step easily drifts toward hermeneutics.

4.1 Externalism, mental phenomena and institutions

Surely language is a mental phenomenon, too, but what is a mental phenomenon? The modern philosophy of mind is an extremely complex field, so I cannot even touch the heated discussions there. Again, I just opt for one approach, which seems to enjoy acceptance by many leading protagonists in the field. This is the basic assumption of brain-mind monism or the rejection of Cartesian dualism (e.g. Dennett 1991). If we take this as a basic proposition, this has the immediate implication that we need to posit that there must be a neuronal correlate to the process of conceptual blending, and that there must be a neuronal correlate to the external uses of language in a community of language users. In other words, it does not make sense to denote as language a set of brain states as corresponding to what we call a mental phenomenon, but language is by definition a conjunction between neuronal and external phenomena. This is not a statement of fact, but a beacon towards which our thinking about these matters has to be directed. It does not necessarily imply reductionism, as monism can be emergentist (Bunge 1979), which in contemporary philosophy is mostly covered by the notion of mental processes supervening on brain processes.

Recently, economics seems to tend towards a related paradigm, which is neuroeconomics as a basis for analyzing human behavior. There is an ongoing discussion about the significance of neuroeconomics for economics, mainly concentrating on the possibility of reductionism that

is discovering brain mechanisms that directly explain a certain behavior. However, this discussion does not take the modern philosophy of mind into consideration. Subsequently, I wish to show that a neuronal approach to performativity does not imply reductionism in the neuroeconomics sense, but ends up with exactly the opposite. This is based on the position of externalism in the philosophy of mind and boils down to the *extended brain* hypothesis, which corresponds the distributed cognition approach in cognitive science (for a general overview over these different fields, see Wilson 2004). In this context, we can set up a non-reductionist, yet monistic paradigm.

Externalism posits that it is impossible to refer to mental content without invoking facts external to the mind or the brain (for a survey, see Schantz 2004). In our context, the prime example is language, as the concepts of language are bound to a community of language users which is by definition external to the individual brain. Insofar as language is a significant aspect of human thought, this means that mental content is external. From this follows that neuroeconomic research can never generate any substantial insight about behavior without taking external facts into consideration. There is no such thing as an ultimate neuronal cause of behavior, as all neuronal phenomena operate in conjunction with phenomena that reach beyond the physical boundaries of the skull. One should emphasize that this is not a somewhat more complicated statement of the old idea that language refers to external objects as meanings. In one version of externalism, which I follow here, the category of meaning is seen as supervening on causal loops between internal and external physical events, which are themselves completely free of any notion of “meaning” in the traditional sense, and this is reconstructed as a proper functioning in the context of evolved structures into which those causal loops are embedded (on teleosemantics, see MacDonald and Papineau 2006a, and more generally, Millikan 2005). In a nutshell, the concept of meaning is dissolved into the notion of function as an outcome of an evolutionary process through time (Dretske 1995).

There is a relatively short and convenient bridge between those foundational issues and the topic of performativity, which can be built via Searle’s theory, again, and which helps to clarify an earlier point made with regard to the need to complement Searle’s theory by a more explicit cognitive science approach. Searle (1995: 113ff.) argues that status functions are by no means necessarily accessible to conscious reflection, in the same way as an experienced player of soccer will never think about all the rules of the game when playing, except from

very exceptional circumstances. Searle posits that status functions presuppose a comprehensive set of background conditions in the neurophysiological system, which he calls abilities or capacities. In principle, we can say that these background capacities are the crucial factor that enables individuals to activate a status function with reference to a particular context. So, the notion of the background correlates contextual phenomena, hence the environment, with internal neurophysiological processes. This relation is a causal structure and is independent from what we naively understand as a mental phenomenon, in the sense of thinking about an object. For example, via a long process of exercising soccer we reach a state in which our neurophysiological apparatus manifests the capacities to act according to the rules of the game with only rare interference of conscious thought. Searle claims that this is also the case for all institutions in society, so that rule-following is not a process that can be described in terms of choices and conscious acceptance and awareness of rules, but has to be understood as a causal loop between environmental cues and the activation of behavioral dispositions, which produce a behavior that an external observer might describe via the status functions. This means, in particular, that rule following is a kind of proper functioning within a certain social structure, and does not need to be based on the category of meaning in the traditional sense. This corresponds exactly with Wittgensteins deconstruction of that category in his notion of rule following in language games, so that we have a precise correspondence between an externalist approach to language and an externalist approach to institutions. We close the argument by adding the notion of performativity, which explicitly defines the kind of action that emerges from this kind of causality. Performativity would take the conceptual position that is left vacant if we abandon the notion of rational rule following.

Following an institution is performing an institution, and hence manifesting causal processes that produce a functional interdependence between the environment and the brain. Thus, performativity is the central concept to understand the co-evolution between brain and environment.

This idea of co-evolution between environment and agents is a classical position also in evolutionary biology, though not a part of the Neodarwinian synthesis. There are more or less radical versions of it. Generally speaking, the bone of contention is where the biologically relevant information is actually located, and even, what the very notion of biological information actually means (Griffiths 2001). The neodarwinist orthodoxy adopts the Weismann doc-

trine and posits that all relevant information is located in the genotype. Alternative positions assume that there are different degrees in which this information is also externalized to the environment. For example, DNA methylation patterns are transmitted via the cell environment and not via the DNA replication directly. One of the most elaborate positions in this regard is the developmental systems approach (Oyama 2001). This implies that the unit of evolution is the *system* of genotype, phenotype and environment, and that there are essential transmissions of information via the environment in which an organism is located. In this relation, the genetic factors do not necessarily have a precise and unique determined function or meaning in the sense of the content of the information, but are related to interpretive processes that correlate environment and the genetic system (Jablonka and Lamb 2006).

This argument is a direct formal correspondence to externalism in the theory of mind. In both cases, the notion of a basic unit of information carrying meaning is abandoned in favor of the notion of an evolved functional interdependence between the environment and the respective information processing physical structure (genotype or brain), such that meanings can only be assigned to the systemic level, but not to the constituent level. Regarding mental content, and coupled with the monistic position, this results into the hypothesis that there must be a conjunction between brain processes and environmental entities in the sense that both constitute a unity.

Thus, the general evolutionary framework applies for both the genetic level and the level of language, which is in turn central for the understanding of institutions. I have to leave this analysis for another paper, so I just point out one important aspect. This is the analysis of creativity, hence the event of new performative acts in the context of language and institutions. Dispositions in relation to institutions do not imply that behavior will always and necessarily manifest the exact patterns that would correspond to the reconstruction of a status function by an external observer. In contrast, we stay on firm ground of brain science if we assume that those dispositions, firstly, will not be identical across individuals, as all individual human brains are unique, and secondly, that individual brains will always produce random variations in the neuronal processes that produce the behaviors (Edelman 2006). Thus, there is always a source of behavioral variety which can evolve into new patterns of behavior and, ultimately, leads to the emergence of new institutions. In the context of the brain sciences, it is straightforward to interpret human creativity as reflecting ordinary functions of the brain (Hesse

1990), without the need to invoke higher level entities such as the human genius. However, we need to maintain the externalist bottom line: To analyze human creativity, it is not sufficient to understand the human brain as an evolutionary system of its own in which random neuronal firings ultimately coalesce into regular patterns and structure (Neuronal Darwinism as proposed by Edelman 1987 or Calvin 1998). Those very fundamental brain processes are already connected with environmental factors in the different time dimensions, that is phylogeny, ontogeny and present action, such that internal selection of what is left as the only purely autonomous neuronal process, i.e. random firings, is always deeply interlinked with the external environment. This is the extended brain/mind hypothesis (compare Sterelny 2004). In other words, without an external anchor the brain would implode into a self-referential solipsistic structure without any fix-point in its random neuronal firings. This external anchor is provided, among other factors, by the recurrent interaction with other brains, mediated via language as an artefact (which has been proposed by Edelman 1987 right from the beginning).

This is a mere sketch of the foundational approach towards performativity that would relate external linguistic phenomena, such as status functions and its constitutive entities, with cognitive processes, such as particular cognitive blends, and neurophysiological structures, in an externalist approach to the human mind. Instead of further exploring this point in a systematic fashion, I wish to present an empirical case to complete the argument in this paper, taking up the red thread of analyzing modern financial markets.

4.2 Financial markets and brains: some preliminary observations

The externalist approach to institutions would imply that we cannot simply analyze financial markets just in isolating one of the two sides, that is, either the rules governing the behavior of agents, or the agents themselves as rational agents. In the actions driving financial markets, dispositions of agents and institutions form a unity. Financial markets are performances in the strong sense. What is missing in the familiar statement of the sociology of finance is an explicit treatment of the microfoundations, reaching through the level of cognition to the level of neuronal processes. This is possible once we consider the close relation between conceptual blending theory and the neural theory of metaphor that has been developed over the past twenty years by Lakoff and others (Lakoff, 2008).

At a closer look, there are also different groups of agents that might behave differently in the context of what we superficially perceive as homogenous financial markets. That means, the actual outcome will also differ across different groups. This is today the bread and butter of behavioral finance research, which shows that many agents do not behave as the standard theory of rationality and efficient markets prescribe. Let me briefly analyze how we can enlarge the scope of behavioral finance by the approach presented in this paper.

As a first step, we have to show that there is a correlation between external phenomena on financial markets and brain processes. There are already many insights how, for example, the introduction of new artefacts on financial markets such as credit cards produces distinctive behavioral patterns because of a different kind of causal connection with the underlying brain processes. That is, there are certain correlates of dispositions and environmental cues, which are changed or even broken when for some reason the environmental cues change their nature. Economists so far do not recognize this as they just posit the rational agent as the best approximation of a market agent, which implies that, for example, the distinction between credit cards and cash should not matter at all, as the former are merely a different way of realizing cash transactions. In fact, however, credit cards produce anomalies in behavior which show that most agents do not perceive them in the same way as cash. As Laibson (1997) has theorized still without reference to brain processes, that might be explained by hyperbolic time preferences which imply that people perceive the losses and gains from spending money very differently depending on whether they give cash away or use a credit card. Meanwhile, there are many neuroeconomic results that show how hyperbolic time preferences relate to distinct activation patterns in the brain (McClure et al. 2007). This boils down to the observation that the artefact of money as cash is differently connected with brain processes than credit cards. There are institutional differences between the two as behavioral dispositions that correlate with the artefact differ. In the case of money as cash, there are strong empirical reasons why we can assume that money directly produces utility, thus contradicting established views on the perfect neutrality of money (Camerer et. al. 2005). That is, the institution of money correlates with a strong disposition to view money as something valuable on its own sake. Indeed, human cultural history reveals the emergence of this pattern in the many myths and religious beliefs about money in human social life. Today, neuroeconomics demonstrates that money, contrary to the expectations of the economist, activates the same dopaminergic circuits in the

human brain as other pleasures, such that psychologists also simply can use money in experiments as a direct reinforcer (e.g. Knutson et al. 2007). As the psychologists Lea and Webley (2005) **have it**, money in modern societies is a mix of a tool and a drug. This easily explains why people behave differently when spending cash and using credit cards, because in the former case the loss aversion toward losing money is strong, whereas in the latter case the immediate gains loom large and the losses are postponed to a more distant future.

This example shows why the hypothesis of the rational agent is ill-suited to understand the interaction between behavior and institutions on financial markets. There is accumulating evidence about causalities that involve human neuropsychological characteristics in the behavioral responses to certain institutional arrangements that may have been set up by rational-constructivistic action. There is a need to systematically ground this in the theory of performativity. In the case of credit cards vs. cash, which should be substitutes in an efficient market with rational agents, in fact we observe different performances, based on different correlates between external artefacts and behavioral dispositions. Thus, the different institutions of cash and money produce different phenomena even on the macroeconomic level, such as different savings rates.

This role of performativity even holds for the most fundamental analytical categories in finance theory. Turner (2008) analyzes risk in terms of a conceptual blend between <Harm> and <Chance>. Chance refers to uncertainty as such, denoting the scope of possibilities. Harm is a negative evaluation of an outcome. Blending the two results into the more complex notion of <Risk>, the two dimensions are not only independent from another, they can also be put into the context of other frames, such as thrill-seeking behavior.

Now, the point is that in recent neuroeconomic research there have been insights into the complex structure of risk processing in the human brain, where there is a distinctive spatial pattern in the differential activation of expected value and variance (for an overview, see McCabe 2008). Further, the well-known hypothesis of loss aversion in prospect theory also can be supported by differential activation of brain areas, as we have seen. That means, there is some evidence pointing towards a direct mapping between the structure of a conceptual blend and brain activity, even for foundational theoretical categories of economic theory. Thus, we end up with the strong hypothesis that even a core concept in economic theory, be-

havior towards risk, might in fact be a behavior that builds on status functions, i.e. is institutionalized to a large degree. Such a direct mapping between concepts and brain activation patterns can also be supported by another sort of research, which is the sociology of finance, again.

In the sociology of finance there is extensive research on the emotional patterns of behavior that underlie trading (Zaloon, 2003, 2004; Hassoun, 2005). This is a far cry from the rational agent hypothesis, but directly supports evidence for Searle's concept of dispositions in the context of behavior towards risk. Evidently, the high speed of decision making on the trading floor and the immense pressure requires a behavioral stance that is mainly guided by emotional reactions which are built on the long experience of becoming a professional trader. This even includes behavioral disciplines which constrain the effects of otherwise possibly detrimental emotions, such as the aforementioned loss aversion. Thus, it might be emotions that finally enable traders to act in a rational fashion, and not rationality as an agent property. Rationality emerges as a correlate between dispositions and the peculiar environment of the trading floor. This includes a central role of a large range of environmental clues, such as the spatial structure of a trading pit, the body language of traders or the metaphorical embeddedness of the language of traders in a male-centered world of violence, thrill and sex.

This brief observation concludes the circle of the argument presented in this paper. This is because emotions play a central role in evolutionary psychology as the coordinating forces in an otherwise chaotic and fragmented brain (Tooby and Cosmides 2005). Clearly, this exactly matches with the notion of a disposition in Searle's approach. Emotions as higher-level neurophysiological structures organize the brain in terms of dispositions that link up behavior with external cues in a regularized way. This is precisely what we observe when we learn that the trader who enacts the equilibrating arbitrage on a neoclassical market is in fact a person who manifests complex emotional responses in a highly dynamic environment, that, almost paradoxically, might end up in a conjunction between individuals and institutions that in fact produces the pattern of rationality that is just presupposed in the economic theory as an axiom. However, this also implies that we cannot assume that everybody behaves in a similar fashion, as the conjunction of dispositions and environmental cues is the outcome of a social selection process.

These analytical sketches demonstrate how we can complete the theory of performativity against the background of externalism in the theory of mind. The empirical counterpart consists in constructing direct causal feedback loops between external artefacts, including language and neuronal processes. There are several high-powered theories already available that provide for this linkage, such as Lakoff's (2008) neural theory of metaphor. This theory posits a number of structural and process-related characteristics of the brain, which correspond to the conceptual analysis of cognition. Concepts are seen as arrangements of neuronal groups which are overlapping and organized into higher-level circuits, such as Gestalt circuits, which manifest a particular mechanism which allows for the activation of an entire circuit if only a partial sensorimotoric input arrives. The different sorts of circuits are built on the fundamental mechanisms of mutual activation or inhibition that channel the flow of networking in a neural system. For the analysis of the cognitive processes that underlie status functions in institutional theory, two larger structural features of connections in the brain are crucial, mappings and bindings. Maps are projections across different brain areas, bindings establish a unity between more simple constituent units which can also relate with independent concepts.

The dynamics of this system is guided by a small number of principles, of which the best-fit principle is very important for the evolution of conceptual structures. The best-fit principle means that the brain maximizes connectivity, under the constraint of given inhibitory relations between neural substructures. This is the force that underlies Gestalt dynamics and the creation of meanings from contextual clues. As a result of these different dynamics, the brain can build more complex linkages between simple mappings and bindings, which in turn can be the object of further mappings and bindings. At the same time, if only for stochastic reasons, those structures can be continuously reshuffled and recreated.

If we embed this theory into the externalist framework, we can conceive linguistic artefacts and other artefacts as triggers on neuronal processes that cause outputs which are in turn processed within the brain and its environment. In particular, artefacts of language play a central role in coordinating neuronal processes via their outputs across individuals.

According to this theory, we can make systematic sense of case studies such as on cash versus credits cards. The different artefacts trigger different neuronal processes. It seems that cash is strongly merged with processes that directly involve positive feedbacks via the dopaminergic

circles. So cash seems activate neural groups via strong bindings. Credit cards are different, so that they might activate mappings that accentuate current satisfaction from immediate consumption. A credit card is a metaphor for expanded consumption opportunities. Thus, neurolinguistic approaches give a view on human economic behaviors that is very different from the established view of standard economics and provide a foundation for behavioral finance.

5 Conclusion

This paper has presented an argument that crosses different areas of research and even scientific disciplines. The starting question was what are the constituents of economic reality? The answer is: economic reality is an ordered set of neurophysiologically rooted behavioral dispositions, conceptual structures and external patterns in the environment, with language playing a central role in the emergence and maintenance of institutions. This complex picture results from a synthesis of different existing approaches in the literature, reaching from Searle's philosophical approach to institutions over Fauconnier and Turner's theory of conceptual blends to recent approaches in neuroeconomics.

The central concept that serves to arrange these different theories into a conceptual whole is performativity. Economic reality is a performance. This does not mean that it is just free-floating as a result of unbound human imagination. I argue in a naturalistic framework, in which meaning is equated with evolved proper functions, so that it manifests a wide range of constraints that exert impact on specific evolutionary paths of change.

There are many implications for economic methodology and method. In conclusion, I just want to highlight one that refers to the recent rise of neuroeconomics (see also Herrmann-Pillath, 2009). On the one hand, the proposed approach offers an additional strong reason why neuropsychological research is foundational for economics, and that the axiomatic approach to rationality is doomed to fail if economics is expected to be an empirically grounded science. At the same time, however, this cannot mean that neuroeconomics can explain even the simplest aspects of human behavior, if it only focuses on the brain as object of research. Hu-

man brains are extended brains, in the sense that their cognitive functions involve the environment in an essential way. In particular, economic behavior always relates internal states of the brain (dispositions) with external artefacts, with language being the most important one. So I expect that a surprising result of the rise of neuroeconomics will be the completion of a linguistic turn in economics, following the track laid by the rise of the philosophy of ordinary language in the mid of the 20th century.

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01.	Nicole Kahmer / Jürgen Moormann Studie zur Ausrichtung von Banken an Kundenprozessen am Beispiel des Internet (Preis: € 120,--)	2003

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Sonnemannstr. 9–11 ■ D–60314 Frankfurt/M. ■ Germany

Phone: +49 (0) 69 154 008–734 ■ Fax: +49 (0) 69 154 008–728

eMail: m.biemer@frankfurt-school.de

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