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Actor-network theory—the market test

Michel Callon

Abstract

It is often argued that ANT fails to offer a satisfactory theory of the actor which is allegedly endowed either with limitless power, or deprived of any room for manoeuvre at all. The aim of this paper is to show that the absence of a theory of the actor, when combined with the role attributed to non-humans in the description of action, is precisely one of the strengths of ANT that it is most important to preserve. This is because this combination makes it possible to explain the existence and the working of economic markets. Any particular market is the consequence of operations of disentanglement, framing, internalization and externalization. ANT makes it possible to explain these operations and the emergence of calculating agents. *Homo economicus* is neither a pure invention, nor an impoverished vision of a real person. It indeed exists, but is the consequence of a process in which economic science places an active role. The conclusion is that ANT has passed one of the most demanding tests: that of the market.

Before embarking on an active and positive critique of the Actor-Network Theory (ANT), I will start by highlighting some of the results obtained by the approach, results which I do not believe we should lose sight of in any debate about what might follow ANT.

One of the shortcomings about ANT which is most often mentioned is the inadequacy of the analysis which it offers in respect of the actor. I shall consider this point at greater length in what follows. However, before proposing ways of enhancing this analysis, I wish briefly to recall a number of positive points which, in my view, should be retained. The most important is that ANT is based on no stable theory of the actor; rather it assumes the *radical indeterminacy* of the actor. For example, the actor's size, its psychological make-up, and the motivations behind its actions—none of these are

predetermined. In this respect ANT is a break from the more orthodox currents of social science. This hypothesis (which Brown and Lee equate to political ultra-liberalism[1]) has, as is well known, opened the social sciences to non-humans. It has also freed them from the sterile individualism/holism dichotomy and, by using the notion of a spokesperson, has made language an *effect* of distribution and not an inherent property. My friend John Law has had the opportunity of developing this notion of distribution and of revealing its richness (Law, 1994; 1998 a and b).

The indeterminacy of the actor naturally entails a number of difficulties. ANT is so tolerant that it ends up presenting an actor which is an anonymous, ill-defined and indiscernible entity. Since everything is action, the ANT actor may, alternately and indiscriminately, be a power which enrolls and dominates or, by contrast, an agent with no initiative which allows itself to be enrolled. It is certainly this aspect which has produced the most negative effects and led to the frequently repeated accusation of relativism. Another way of formulating the critique is to say that ANT's main shortcoming is that it is everything but a theory—which explains why it cannot explain anything!

What I would like to do in this paper is to show how ANT can explain actors' competencies, without however denying its basic hypotheses and, in particular, without calling into question the refusal to give an a priori definition of the actor or the role of non-humans in action.

In order to do this—and in order to put ANT to a test—I will offer an analysis of the economic market. The market is an institution which mixes humans and non-humans and controls their relations. What economic theory describes is, among other things, the circulation of goods and the allocation of resources between human agents. It would be worrying if ANT had nothing to say about the market when it was all along designed specifically to describe and analyse those imbroglios in which humans and non-humans alike are involved. Yet the market is a considerable challenge for ANT because it introduces a strict separation between what circulates (goods which are inert, passive and classified as non-human) and human agents who are active and capable of making complicated decisions (producers, distributors and consumers). Moreover, on the market, whether we are referring to real markets or those of economic theory, the agents involved are characterized by very specific and highly demanding competencies: they are calculating, know and pursue their own interests, and take informed decisions. In short, the market seems to

undermine ANT's hypotheses. ANT was developed to analyse situations in which it is difficult to separate humans and non-humans, and in which the actors have variable forms and competencies. Whereas the market is diametrically opposed to this situation: everything is delimited and roles are perfectly defined.

The question is then: is ANT of any use to us for understanding markets? And if so, in what ways will it have to be modified?

1. The market as a network

What is a market? There are numerous answers to this question but Guesnerie's definition seems well-suited to our argument (Guesnerie, 1996). According to him, a market is a co-ordination device in which: a) the agents pursue their own interests and to this end perform economic calculations which can be seen as an operation of optimization and/or maximization; b) the agents generally have divergent interests, which leads them to engage in c) transactions which resolve the conflict by defining a price. Consequently, to use his words:

> 'a market opposes buyers and sellers, and the prices which resolve this conflict are the input but also, in a sense, the outcome of the agents' economic calculation'

This definition has the merit of emphasizing the essential. That is:

- the decentralization of decision-making;
- the definition of actors as calculating agents;
- conflicts of interest which are resolved in transactions that establish an equivalence measured by prices.

The point that needs to be borne in mind is that the agents enter and leave the exchange like strangers. Once the transaction has been concluded the agents are quits: they extract themselves from anonymity for a moment only, slipping back into it immediately afterwards.

As this definition shows, the market as a method of co-ordination implies the existence of agents capable of calculation. This is confirmed by Williamson in his discussion of the notion of trust (Williamson, 1993).

> 'Calculativeness is the general condition that I associate with the economic approach and with the progressive extension into the related social sciences'.

Let us accept this hypothesis and ask ourselves the following question: Under what conditions is calculativeness possible? Under which conditions do calculative agents emerge?

In order to write and conclude calculated contracts—that is to say, to go into the content of goods and their prices—the agents need to have information on the possible states of the world. More specifically, for calculative agents to be able to take decisions they need at least to be able to:

i) establish a list of the possible states of the world;
ii) rank these states of the world (which gives content and an object to the agent's preferences);
iii) identify and describe the actions which allow for the production of each of the possible states of the world.

Thus, if market co-ordination is to succeed, there have to be not only calculative agents but also agents with information on all the possible states of the world, on the nature of the actions which can be undertaken and on the consequences of these different actions, once they have been undertaken.

Market co-ordination encounters problems when uncertainties about the states of the world, on the nature of the actions which can be undertaken, and on the expected consequences of these actions, increase. Problems are at their worst when the uncertainties turn into ignorance, pure and simple. Now, such situations are the rule and not the exception. This is even more obvious with the uncertainties generated by technoscience. The general question is thus the following: how are agents able to calculate when no stable information on the future exists? (Eymard-Duvernay, 1996)

In order to maintain the possibility of co-ordination, economists have proposed several solutions which—they assure us—are, or ought to be, applied in concrete market situations. The most 'orthodox' solution is that of *contingent contracts*. Contingent contracts are revisable contracts; their renegotiation is planned, thus taking into account the occurrence of events specified beforehand. The greater the uncertainties, the more difficult it is to use this approach. It implies that agents spend a considerable amount of their time renegotiating their contracts, that is to say, interacting and exchanging information as it is produced. In this case market co-ordination as such disappears, leaving room for uninterrupted social interaction involving many different agents. These agents, no matter how much they wish to do so, are no longer able to become strangers; they are entangled. I shall return to this notion in a minute.

Another solution is that of a *focal point*. Here it is assumed that agents share common knowledge which guarantees their co-ordination. The nature of this knowledge is highly variable. It may pertain to a shared culture, rules, procedures, routines or conventions which guarantee the adjustments and predictability of behaviour. Socio-economics has studied these intermediate realities in detail in order to explain the co-ordination of market action. But it is easy to show that these different solutions suffer from the same limits. Whether we talk about a common culture or of shared rules or conventions, we encounter the same stumbling block: rules, conventions or cultural devices do not govern behaviour completely since they imply irreducible margins of interpretation. Here again, these margins of interpretation can be removed only during interaction, negotiation or discussion.

A third, and opposite, solution to the question of co-ordination is to assume that beneath the contracts and the rules, there is a 'primitive' reality without which co-ordination would not be possible. An understanding of this ultimate basis is the purpose of the notion of a social network (Swedberg, 1994) or, more broadly, the notion of embeddedness as initially formulated by Polanyi (1957) and later refined by Granovetter in two brief but seminal articles (Granovetter, 1973; 1985). If agents can calculate their decisions, it is because they are entangled in a web of relations and connections; they do not have to open up to the world because they *contain* their world. Agents are actor-worlds (Callon, 1986).

It is useful to recall these two articles for they have been the source of many misinterpretations which prevent us from seeing both the originality and the true limits, of Granovetter's solution. His solution lies in his definition of the notion of a network. Granovetter first does away with the classic opposition between *homo sociologicus* and *homo economicus*. He shows, convincingly, that beyond their often-asserted differences, they have in common the characteristic of both being individual agents with perfectly stabilized competencies. The thesis of over-socialization and that of under-socialization, share a common hypothesis: that of the existence of a person closed in on himself—*homo clausus*, to use Elias' expression. This hypothesis precludes any solution to the problem of co-ordination in a situation of radical uncertainty.[2] For Granovetter the only possible solution is that provided by the network; not a network connecting entities which are already there, but a network which configures ontologies. The agents, their dimensions, and what they are and do, all depend on the morphology of

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Framing is an operation used to define individual agents which are clearly distinct and dissociated from one another. It also allows for the definition of objects, goods and merchandise which are perfectly identifiable and can be separated not only from other goods, but also from the actors involved, for example in their conception, production, circulation or use. It is owing to this framing that the market can exist, that is to say, that distinct agents and distinct goods can be brought into play since all these entities are independent, unrelated and unattached to one another.

What economists say when they study externalities is precisely that this work of cleansing, of disconnection, in short, of framing, is never over and that in reality it is impossible to take it to a conclusion. There are always relations which defy framing. It is for these relations which remain outside the frame that economists reserve the term externalities. The latter denotes everything which the agents do not take into account and which enables them to conclude their calculations. But one needs to go further than that. When, after having identified them, the agents, in keeping with the predictions of Coase's famous theorem, decide to reframe them—in other words to internalize the externalities—other externalities appear. I would suggest the term 'overflowing' to denote this impossibility of total framing. Any frame is necessarily subject to overflowing. It is by framing its property rights by means of a public patent that a pharmaceutical firm produces externalities and creates overflowing. It is by purifying the products that it markets that a chemical firm creates the by-products which escape its control.

The impossibility of eliminating all overflowing has, in reality, a profound cause which I shall merely point to in this piece (Callon, 1998). To ensure that a contract is not broken, to delimit the actions that can be undertaken within the framework of this contract, the agents concerned have to mobilize a whole set of elements; these are, to use Leigh Star's expression, boundary-objects (Star & Griesemer, 1989). These objects make possible the framing and stabilization of actions, while simultaneously providing an opening onto other worlds, thus constituting leakage points where overflowing can occur.

Let us take the simplest example, that of a market transaction concerning a motor car. The transaction is possible because a rigorous framing has been performed. This framing has reduced the market transaction to three distinct components: the buyer, the producer-seller, and the car. The buyer and the seller are identified

without any ambiguity, so that property rights can be exchanged. As for the car, it is because it is free from any ties with other objects or human agents, that it can change ownership. Yet even in this extreme and simple case not all ties can be cut. Something passes from the seller to the buyer: the car, which conveys with it the know-how and technology of the producer. All the property rights in the world cannot prevent this overflowing, except by eliminating the transaction itself. If the buyer is a firm, reverse engineering becomes possible. This is a general point which can be expressed as follows: the simple fact of framing the transaction leads to overflowing because it mobilizes or concerns objects or beings endowed with irreducible autonomy. Complete framing is a contradiction in terms.

The framing/overflowing duo suggests a move towards economic anthropology and more specifically towards the entangled objects of Thomas and the careers of objects of Appadurai (1986).

I shall settle for recalling Thomas's thesis, noting that it expands on and enhances Appadurai's: one is not born a commodity, one becomes it. It is also Thomas who gives the best explanation for this reconfiguration in his discussion of the distinction between market transaction and gift. His argument is fairly complex and sometimes even obscure. I think, however, that it is summed up in the following citation (Thomas, 1991):

> 'Commodities are here understood as objects, persons, or elements of persons which are placed in a context in which they have exchange value and can be alienated. The alienation of a thing is its dissociation from producers, former users, or prior context' (p.39).

The last sentence of this citation is obviously the important one. To construct a market transaction, that is to say to transform something into a commodity, it is necessary to cut the ties between this thing and other objects or human beings one by one. It must be decontextualized, dissociated and detached. For the car to go from the producer-seller to the customer-buyer, it has to be disentangled. It is only if this can be achieved that the calculation can be looped; that the buyer and the seller, once the transaction has been concluded, can be quits. If the thing remains entangled, the one who receives it is never quits and cannot escape from the web of relations. The framing is never over. The debt cannot be settled.

This notion of entanglement is very useful, for it is both theoretical and practical. It enables us to think and to describe the process

of commoditisation which, like the process of framing or of disentanglement, implies investments and specific actions to cut certain ties and internalize others. The advantage is that this analysis applies generally, and enables one to escape from the risk of essentialism. Anthropological studies of money are most informative from this point of view. Money seems to be the epitome of the commodity; it is pure equivalence, pure disentanglement, pure circulation. Yet as Viviana Zelizer showed so convincingly, agents are capable of constantly creating private money which embodies and conveys ties (Zelizer, 1994). This is the case of the grand-mothers who gives her grand-daughter silver coins, or supermarkets which give fidelity vouchers to their customers. To entangle or disentangle are two opposite movements which explain how we move away from or closer to the market regime. Both movements can apply to any entity. No calculation is possible without this framing, a framing which makes it possible to provide a clear list of the entities, states of the world, possible actions and expected outcome of these actions.

3. Framing and the construction of calculative agents

Very few studies exist in which analyse the work of framing which allows calculation. To my knowledge the best study is that of Marie-France Garcia on the transformation of the table strawberry market in the Sologne region of France (Garcia, 1986). This transformation occurred in the early 1980s and resulted in the constitution of a market with characteristics corresponding to those described in political economy manuals:

— the existence of a perfectly qualified product;
— the existence of a clearly constituted supply and demand;
— the organization of transactions allowing for the establishment of an equilibrium price.

Garcia analysed all the investments required to produce the frames allowing for the construction of this market. First material investments were needed. Un-coordinated transactions between producers and intermediaries engaged in interpersonal relationships were replaced by interactions held in a warehouse built for this purpose. The producers took their product there daily packed in baskets, and exhibited it in batches in the warehouse. Each batch had a corresponding data sheet which was immediately given to the auctioneer.

The latter entered the data into his computer and compiled a catalogue which was handed out to the buyers. Producers and shippers then went into the auction room which was designed in such a way that buyers and sellers could not see one another but nevertheless had a clear view of the auctioneer and the electronic board on which prices were displayed. The display of the strawberries in the hall and the catalogue enabled all parties concerned to have precise knowledge of the supply in terms of both quality and quantity. Moreover, the fact that the different batches were displayed side by side highlighted differences in quality and quantity between producers. The latter could compare their own production with that of their competitors, something which had not been possible formerly when collections were made locally. As Garcia notes: 'those growers who had been caught up in personal relationships with intermediaries and shippers entered into impersonal relationships' (Garcia-Parpet, 1996).

All of these different elements and devices contributed to the framing of transactions by allowing for the rejection of networks of relations, and thus by constructing an arena in which each entity was disconnected from the others. This arena created a space of calculability: the technique of degressive bidding, the display of transactions on the electronic board, the relative qualification of batches of strawberries on their data slips, and knowledge of the national market all made the transactions calculable. As this example clearly shows, the crucial point is not that of the intrinsic competencies of the agent but that of the equipment and devices which give his/her actions a shape.

The importance of the introduction of such tools is starting to be well documented. It is unquestionably one of the essential contributions of science studies. The work of Peter Miller has, for example, highlighted the role of accounting tools in the construction of agents capable of calculating (Miller, 1998). What Garcia clearly shows is all the devices—material (the warehouse, the batches displayed side by side), metrological (the metre) and procedural (degressive bidding)—which give these instruments their power and effect.

Garcia's study serves moreover, to specify the respective roles of the instruments of calculation, of material investments and of economic theory in this process of framing and of constructing spaces of calculability. In the construction of the strawberry market, a young counsellor of the Regional Chamber of Agriculture played a central part. The remarkable thing is that his action was largely

inspired by his training in economics received at university and his knowledge of neoclassical theory. The project, which he managed to launch through his alliances and skills, can be summed up in a single sentence: the construction of a real market on the pure model of perfect competition proposed in economics handbooks. As Garcia says, it is no coincidence that the economic practices of the strawberry producers of Sologne correspond to those in economic theory. This economic theory served as a frame of reference to create each element of the market (presentation on the market of batches which account for only a small portion of the supply; classification of strawberries in terms of criteria which are independent of the identity of their producers; unity of time and place making the market perfectly transparent; and, finally, the freedom of wholesalers and producers alike who are not obliged to buy or sell).

This case provides an outstanding example in that it enables us to follow the birth of an organized market. Above all, it is the purest and most perfect example of market organization. The conclusion that can be drawn from it is extremely simple yet fundamental: yes, *homo economicus* does exist, but is not an ahistorical reality. It does not describe the hidden nature of the human being. It is the result of a process of configuration, and the history of the strawberry market shows what this framing consists of. Of course it mobilizes material and metrological investments, but we should not forget the essential contribution of economics in *performing* the economy (Callon, 1998). The study of this contribution constitutes a vast project for the future. ANT and, more generally, science studies, provide an invaluable resource for studying this contribution.

4. Conclusion

So what does ANT contribute to the understanding of economic markets?

On the whole I find the assessment positive and encouraging. ANT enables one to go further than do traditional socio-economics or analyses in terms of networks proposed by people like Granovetter. Markets are not embedded in networks. In other words, it is not a question of *adding* social, interpersonal, or informal relations in order to understand their functioning. A concrete market is the result of operations of disentanglement, framing, internalization and externalization. To understand a market it is necessary first to agree to take what it does seriously; that is to say,

the construction of calculative actors who consider themselves to be quits once the transaction has been concluded. This does not mean that everything has been framed and internalized and that no relations other than market relations exist. I have suggested that complete disentanglement is impossible; framing can function and survive only if there is overflowing, and connections have not been internalized. But it is one thing to see these links and relations as having been voluntary and actively rejected from the framework of market relations, with the precise aim of locally and temporarily purifying market relations; it is quite another to say that the market is possible and functions only because these relations are present and form, in a sense, the substratum of market exchange.

The metaphor of framing and externalization (taking into account only those relations which make it possible to conclude the calculation) is not the same as that of embeddedness and of social construction (taking into account informal relations in order to account for the possibility of a calculation). In one case the configuration of market relations and of the market is taken seriously, while in the other case all the overflowing that the market cannot prevent is highlighted. In one case we believe in *homo economicus*—although a *homo economicus* that is variable, configured, framed, etc.—and in the other case we denounce him as an abstract invention. ANT, which allows entities to define and construct one another, is well suited to observing the construction of *homo economicus*. With its focus on the role of technical devices and scientific skills in the performing of the collective, ANT highlights the importance of the material devices and of natural science but also of the social sciences in general and economics in particular, in performing the economy.

A final remark regarding the actor. As I mentioned earlier, ANT has often been criticised for presenting actors guided by the quest for power and solely interested in spreading networks and their influence. We have probably sinned, although it was a venial sin. What is shown by the study of the market—and hence of the gift—but also by the exploration of other regimes such as that of political representation, is the variety of possible configurations of action and actors (Hennion, 1993). In a network of pure scientific mobilization, the actor resembles that dreadful white male enamoured of power and aligning the world around himself. In a market network he is calculating, selfish and impersonal. The good news is that in a network of gifts, s/he gets tangled in links and relations that s/he does not want and from which he cannot disentangle him or herself.

Suddenly he is generous and altruistic. In political representation s/he makes words proliferate and renders the world talkative, which is not necessarily unpleasant. This amounts to saying that there are no model actors. The identity of the actor and the action depends precisely on these configurations, and each of them can be understood only if we agree to give humans all the non-humans which extend their action. It is precisely because human action is not only human but also unfolds, is delegated and is formatted in networks with multiple configurations, that the diversity of the action and of the actors is possible.

At the start of this paper I was ready not only to recall Actor-Network Theory, but possibly to change the model and to launch a new range. In concluding it I am more optimistic. In short, it has passed one of the most demanding tests: that of the market. And if it has passed it is because ANT is not a theory. It is this that gives it both its strength and its adaptability. Moreover, we never claimed to create a theory. In ANT the T is too much (*'de trop'*). It is a gift from our colleagues. We have to be wary of this type of consecration especially when it is the work of our best friends. *Timeo danaos et dona ferentes*: I fear our colleagues and their fascination for theory.

Notes

1 See Lee and Brown (1994).
2 Elias (1978).
3 This point is addressed by Burt in a formal manner (Burt, 1993).

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