The facts and values of experimental economics[1]

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Preliminary draft.

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Introduction

Experimental economics has brought revolutionary change to economics. Not only has experimental research transformed a discipline which has long been considered to be a non- experimental science into "one where some of the most exciting advancements are driven by laboratory data" (Guala, 2010: 99), but it has also transformed the way economists do economics. Economics is gradually becoming "a more genuinely empirical science" insofar as economics theories are increasingly being built from observed regularities, rather than logically deducted from *a priori* principles (Bardsley, 2010: 345-6). These methodological transformations are in turn changing economists' views of their own discipline and of science more generally.

The strong scepticism encountered toward laboratory experimentation in economics has forced experimental economists to reflect on their own experimental practice and put forward arguments that could justify the relevance of experiments to economics. In their methodological reflections, they followed on going discussions in the philosophy of science, which feedback on their views on both economics and science.

The use of experiments in the investigation of topics unexplored by other means has in turned inspired new research agendas which are too impacting on economists' views on their own discipline. Together with other emergent research programs of economics (e.g. behavioral economics), experimental research has produced evidence that challenge two fundamental assumptions and commitments of the previously dominant neoclassical economics research program, namely the neoclassical economics models of human action, *homo economicus*, and of the market. Besides changing the practices of economists, experimental economics is also transforming the contents of economics.

[1] This chapter draws on Santos (2010a, forthcoming).

In this chapter, I review the main challenges experimental economics posses to most ingrained values of economists, regarding their conception of science, in general, and that of economics, in particular. I will focus in particular on the work and methodological reflections of experimental economics' most prominent practitioner, the Nobel Prize laureate Vernon Smith. Even though Smith's views do not generalize for the community of economists, they nonetheless allow us to draw some general conclusions about the implications of experimental research to long held dichotomies such as those pertaining to the fact/value distinction and the separation between positive and normative economics.

The 'values' of experimental economics: the hypothetico-deductive perspective

Notwithstanding some early sporadic incursions, experimental economics is an advent of the second half of the twentieth century. It emerged at a time when the hypothetico-deductive method was taken to be *the* scientific method that economists were to follow if they wanted economics to be a science (Sugden 2008, Bardsley et al. 2010, ch. 4). Theories were to be built deductively from *a priori* assumptions about, rather than from observations of, human behaviour, and have their predictions tested against evidence from the real world. At the time, the most obvious function for experiments was thus the empirical testing of economic theory (Smith 1980, 1982; Wilde 1981, Plott 1982, 1991).

Experimental economists (Smith 1982) first adopted falsificationism, a very popular methodology among economists at the time. Falsificationism (Popper 1959, 1965) provided economists with a framework that could render economics experiments comprehensible to the profession as falsifying tools of economic theory. Good scientific practice on this view consisted of the proposal of 'bold conjectures' and their submission to 'severe testing'. This meant that economists should propose hypotheses that make low-probability predictions about the world and then deliberately attempt to produce evidence that falsifies the theory. If the test generated negative evidence, the theory was refuted and, as a result, it should be discarded and replaced by a new one. If the hypothesis survived the test, the theory was instead corroborated, meaning that the theory has resisted attempts at falsification.

Later, awareness that falsificationism does not provide the most adequate methodology to account for and guide experimental practice has led economists to gradually revise their conception of science. Experimental economists then recognized the difficulties entailed by the Duhem-Quine thesis (Bardsley et al. 2010, Smith 1989, Smith et al. 1991), namely that the confrontation of theory with evidence is not simply a logical exercise. The test of

any theory always involves a test system: a conjoint test of a target hypothesis (i.e. the hypothesis derived from theory) together with a variety of auxiliary hypotheses necessary to implement, construct, and execute the test. Thus, when experimenters obtain disconfirming data for the hypothesis under test they do not know which hypothesis(es) is(are) falsified. This means that a clash between theory and evidence does not have the decisive disproving force suggested by falsificationism. This is especially the case when the theory is well-established because scientists will tend to question empirical results instead of the theory itself. By the same token, a confirming test result does not provide definitive support for the target hypothesis, for the positive result may be explained by factors other than the validity of the hypothesis under test.

From falsifying instruments economics experiments then became tools for producing "extensions in the theory that increase its empirical content" (Smith 1989: 152) within the framework of the Lakatosian methodology of scientific research program (Lakatos 1970), the new model of good scientific practice. The more tenable methodology of scientific research programs could better account for the practice of economists, who seldom reject well-established theories on the basis of experimental evidence alone. Lakatos could more easily allow construing experimental economics as a progressive research program. Whatever the results of experiments, the ultimate goal is to increase the theory's empirical content, which can be done either by pushing the edge of the theory's validity when it survives the test or by modifying the theory in the light of disconfirming evidence.

The conception of economics experiments continued to evolve, however, and in the course of his subsequent methodological reflections, Smith (2002, 2008) integrated in his arguments the actual practices of experimental economists, who generally did not follow any particular set of strict rules. That economists do not follow any particular methodology is not a failure of economics, it is instead a failure of what Smith calls "rational constructivist" methodologies. He says:

> The failure of all philosophy of science programs to articulate a rational constructivist methodology of science that serves to guide scientists, or explain what they do, as well as what they say about what they do, does not mean that science is devoid of rationality or that scientific communities fail to generate rational programs of scientific inquiry. Thus, scientists engage in commentary, reply, rebuttal, and vigorous discussions over whether the design is appropriate and the tests adequate, whether the procedures and measurements might be flawed, and whether the conclusions and interpretations are correct. One must look to this conversation in the scientific

> community in asking whether and how science sorts out competing primary and auxiliary hypotheses after each new set of tests results is made available. (Smith 2008: 284)

Thus, despite the fact that empirical testing involves judgment about what parts of the theoretical and empirical system to revise in the face of disconfirming evidence, science is not irrational or non-rational. The collective process whereby scientists access their test systems may be presumed to be rational, a rationality that derives from the collective processes of production and validation of knowledge. This is according to Smith "a form of ecological rationality", which "rightly and inevitably grows out of the rule-governed norms, practices, and conversation that characterize meaningful interactions in the scientific community" (ibid).

The call for an experimental method for economics has forced Smith to address methodological issues and acquaint himself with on-going debates in the philosophy of science. He eventually followed the naturalistic turn in the philosophy of science, and grounded his arguments on the actual practices whereby economists produce knowledge by experimental means. The focus on the role of experiments as tests of theory forced him to recognize that empirical testing is not merely a logical exercise based on the confrontation of theoretical hypotheses with the hard facts discovered in the laboratories. The construction of test systems and the interpretation of experimental results require evaluative judgments by the community of researchers, based on the practices, norms, and evolving institutional rules governing the critical interactions of scientists. In experimental economics, these evaluative judgments lead to the design of new experiments to explore how results are, or are not, influenced by changes in procedures, context, instructions, and control protocols. This is in the end what makes experimental economics a rational collective enterprise.[2]

The use of experiments in the testing of theories has made economists recognize that the fact/theory or fact/value dichotomies are not tenable. Experimental testing is irremediably affected by the Duhem-Quine problem. Experimental 'facts' need to be interpreted and often they give rise to competing explanations with diverse implications for economic

[2] Santos (2010b) offers an account of experimental economics along this line, highlighting the epistemic value of the collective processes of knowledge production, namely its role in the identification and test of the effect of consciously and unconsciously held beliefs and the arbitrariness of decisions taken in the course of experimental practice. It pays equal attention to economists' practical engagements with their objects of study, and in particular, to the participation of human subjects in experiments.

theory. Collectives of scientists guided by collectively established rules of scientific practice will then attempt to settle the issues in dispute. But from this it does not follow that science is irrational. Rationality emerges within the community of scientists, and it is grounded on the practices, norms, and evolving institutional rules governing the critical interactions of scientists.

The 'values' of experimental economics: the 'inductive' turn

Early experiments had theory testing as their stated goal. Because they produced surprising results in the light of standard economic theory, they inspired the design of novel experiments to explore the phenomena produced by experimental means. Gradually the discipline started "to treat experimental observations as part of the material that it is to explain", marking a "momentous methodological step" in a discipline that has long been a hypothetico-science (Bardsley et al. 2010: 167). Economics experiments have in this way acquired a life of their own, autonomous from theory. Economics experiments have become 'exhibits', recording the discovery of interesting phenomenon in a form that other scientists can verify or challenge. They have thereby produced a list of 'stylized facts', which are now being used as empirical basis for the (re)construction of economic theory. (Sugden 2005, 2008, Bardsley et al. 2010).

As mentioned above, experimental results are not self-evident. They are often amenable to various, if not conflicting, interpretations. Experimentalists then check those results they regard as surprising by designing and conducting further experiments to settle the points of contention. A general pattern can be identified. At first, follow-up experiments investigate whether the experimental phenomenon is to be attributed to an 'artefact' of the experimental procedure. This normally calls for the re-examination of the standard procedures of experimental economics (e.g. experimenters check instructions for lack of clarity, subjects' inexperience, adequacy of the reward structure, and other conventional sources of 'error' in experimental economics).[3] If the phenomenon remains recalcitrant, attention is directed to investigating its causes. Experimentalists then obtain a more precise specification of the phenomenon under scrutiny and of the conditions in which it is more likely to be observed. At a later stage, when the phenomenon is better understood, experimenters try to put forward and test tentative explanatory hypotheses. Earlier results may then be reinterpreted, areas of disagreement narrowed down, and what were

[3] See Santos (forthcoming).

apparently conflicting results may eventually be integrated into a more general and complete account. Or, on the contrary, the conditions under which the phenomenon occurs may be more narrowly defined and earlier conclusions may be substantially revised.

Experimental economics has by now a substantial report of exhibits. The most famous exhibits include the common ration effect, preference reversals, the endowment effect, the ultimatum game, and the public goods game, which have inspired theoretical developments that attempt to account for observed behaviour. "Prospect Theory" (Kahneman and Tversky, 1979), for example, explains the endowment effect (overvaluation of the goods one possesses) in terms of people's aversion to losses. The "Theory of Fairness, Competition and Cooperation" (Fehr and Schmidt, 1999), to give another example, explains pro-social behaviour observed in the ultimatum game and the public goods game in terms of people's tendency to reciprocate. It is thus in this way that exhibits are taken to invert the relationship between experiment and theory, where theory is built inductively from evidence.

The use of experiments in the discovery of empirical regularities is also changing economists' conceptions of science and of economics. The most significant of which concerns the discipline's separation between 'pure' and 'applied' science, where the higher rank of the pure science of economics, constructed from *a priori* analysis from self-evident axioms, was contrasted to the subordinated domain of applied economics, which adapted, without challenging, pure theory to fit empirical data (Bardsley et al. 2010). Experimental research blurs the separation between pure and applied science as economists are increasingly interested in the investigation of the psychological underpinnings of economic behaviour, propose new theories to account for their observations, and derive policy implications from them. They have supported the proposal of various policies in the construction of new markets (e.g. Roth, 2002) and of de-biasing policies that aim to tackle human error in individual-decision making (e.g. Thaler and Sunstein 2008).[4] As a result, economics is becoming a more pluralistic science.

The 'facts' of technological experiments

Regardless of the intended goals of experiments, economists do obtain stable empirical regularities with them, which they then try to understand and explain. Based on this accumulated knowledge, theories have been developed and policy recommendations

[4] See Santos (2010a).

have been drawn from, and applied to, real world situations. In this regard, two grand categories of experiments can be distinguished according to the content of the knowledge claims that can be derived from them and resulting policy implications – technological and behavioral experiments (cf. Santos 2007, 2010b).

Technological experiments produce knowledge claims about microeconomic institutions (Santos 2007, 2010b), falling within this category most market experiments in the subfields of industrial organization, asset markets and auctions (Kagel and Roth 1995) that investigate the institutional characteristics of particular industries, special markets, or the transaction of commodities with singular properties.

Smith (1962) launched this research program with his first double auction experiments, aimed at testing competitive price theory. Because this required specifying the process rules and procedures of the market mechanism, which were left unspecified in economic theory, it called Smith's attention to the importance of market rules to both individual behaviour and market performance. In short, it made Smith acknowledge that 'institutions matter'. Experimental economists have been particularly interested in studying the incentive-compatibility of market mechanisms (Smith 1982), i.e. whether the set of market rules lead each economic agent to choose the action that is the best utility-maximizing response to the other agents' actions and whether a social optimum obtains in the sense that no one can increase his utility without decreasing that of others (in other words, if the market is capable of generating a Nash equilibrium whose outcomes are Pareto optima).

Technological experiments have produced a substantial amount of evidence of the relative performance of various market mechanisms (e.g. Holt, 1995). And more recently they have been used as engineering tools for building new markets from scratch. That is, they have been used for building 'economic machines' which 'are supposed to work for several years, in different contexts and without constant supervision of their manufacturer' (Guala, 2001: 464) or 'testbeds' of 'a working prototype of a process that is going to be employed in a complex environment' (Plott, 1997: 605). In sum, this strand of research has turned experiments into engineering tools for economic design (Roth, 2002; Santos and Rodrigues, 2009)**.**[5] According to Smith, this role of experiments was facilitated by the more open dialogue between experimental economists and managers and policy makers in industry and government, who *qua* problem-solvers, are more familiar with the

[5] This is in fact what explains the label attributed to this category of experiments.

experiential base experiments provide than with the abstraction of economic theory (Smith, 2008: xv).

More importantly for the present discussion, tough, market experiments and their use as testbeds have forced economists to explicitly recognize that markets are the outcome of complex social engineering processes that determine the rules under which individuals are to act and the aggregate results that obtain by having economic agents interacting under these rules (Roth, 2002). Rather than assuming at the outset that markets ensure economic efficiency via the symbiotic conjunction of agents' rationality and the information disseminated through prices, as conventional economists do, experimental economists are devoted to the experimental study of 'the rules of private property' given their role in determining market outcomes.

For someone not familiar with the economics discipline this might seem surprising. But in fact the 'market', the central institution of neoclassical economics, has not been constituted as an object of study in mainstream economics. Until the experimental advent there has been little interest in studying how specific markets operate and how prices are actually obtained. Instead, it has been taken as a relatively homogenous and undifferentiated entity, to which are associated vague notions of supply and demand that jointly determine the equilibrium price of commodities (Hodgson, 2008). There is a general sense that experimental economics has contributed to change this state of affairs. And we are now moving "from a period when 'the market' has been left implicit and undefined to an era in which markets are becoming the centre of attention". Economics has hence "become less fixated upon agency and more concerned to theorize the meaning and significance of a diversity of (small-m) markets" (Mirowski, 2007: 211). Nonetheless, on Smith's view (2008: xiv), market experimentation and conventional economic theory are compatible; the former complements the latter, allowing the study of "the missing dynamic process analysis that had not been part of the standard equilibrium tool kit".

However, economists' attempts at creating and implementing particular kinds of market mechanisms brought to the fore the problems of 'rational constructivist' economic theory. As Smith (2008: 2) describes, conventional economic theory applies constructivist rationality to individuals and organizations. When applied to individuals, it makes "deliberate use of reason to analyze and prescribe actions judged to be better than alternative feasible actions that might be chosen". When applied to organizations it aims at "optimal design", that is "the deliberate design of rule systems to achieve desirable performance" by providing "incentives for agents to choose better actions than would result from alternative arrangements". Constructivist rationality contrasts to ecological

rationality which “refers to emergent order in the form of the practices, norms, and evolving institutional rules governing action by individuals that are part of our cultural and biological heritage and are created by human interactions, but not by conscious human design” (ibid). That is, constructivist rationality is a requirement of theories to calculate equilibrium, not of individuals or organizations.

If market design is to be effective in bringing about desirable outcomes, it must be ecologically rational. It must have fitness properties in the sense that the natural cognitive skills of economic agents must lead to the exploration of opportunities that produce the efficient outcomes predicted by the modeller. But new designs will most naturally fail in their first trials because some of the assumed specifications in rational constructivist designs will not be valid. Market building will most likely be a long process of trial and error:

> You begin with a precise theoretically ‘optimal’ auction procedure . . . It was an elementary exercise in constructivism, but it was not ecologically fit. In implementation, the model encountered behavioural incentives or ‘strategic’ problems not considered as part of the original theory and likely intractable from a theoretical point of view. You come up with a rule ‘fix’ to provide countervailing incentive. This creates a new problem requiring a new rule adjustment, and so on. (Smith 2008: 129)

Experiments can offer ecological fitness tests to new market mechanisms before their being implemented in the field. But market building is admittedly a complex and uncertain endeavour, even in the simpler cases, such as in auction design:

> Auction design requires balancing a number of competing considerations, each one of which has an uncertain weight in the final specification of the mechanism to be used. Achieving the balance is a problem in trial-and-error selection among alternatively constructively rational designs to find and chose an ecologically rational design; even if one has managed to come up with what is believed to be a sophisticated constructivist model of the process, it must be tested to see whether it is also ecologically fit because of the inherent uncertainty in conjectures as to which assumptions are relevant in abstract modelling. (Smith 2008: 144-5).

Even though constructivist models can be first tested in the lab, the ultimate test is in the actual implementation of market designs in the field, which, as we have seen, will likely lead to a cycle of rule ‘fix’. The process of market building is always a context-specific endeavour whose rules must take into account the specificities of the good to be exchanged and the economic environment where it is to be implemented. Mechanism

design is specifically an exercise of finding efficiency-promoting rules that deal with both the cognitive limitations of real economic agents and the strategic opportunities of the economic environments that may compromise the goal set before hand. That is, mechanism design concerns the building of incentive-compatible mechanisms that should align individual and collective interests in such a way that individuals' incentives correspond to what is needed to achieve group optima, while making sure that economic agents understand the incentive structure so that they behave accordingly.

For instance, in the famous FCC spectrum auctions the goal was clearly defined – awarding the licenses for the use of airwave spectrum to those who value them most and can most effectively employ them –, which required building a mechanism that allowed bidders to estimate their maximum willingness to pay the value of the auctioned item, and make sure they submit this value in the form of a bid. Because the auction first implemented did not succeed preventing bidder's collusive practices, further amendments were introduced designed to limit strategic exploitation by the bidders, imposing further constrains on their behaviour (Smith 2008: 137-148). That the definition of efficiency-promoting rules requires imposing strict constrains on human behaviour is well documented in double auction experiments that function well even with zero-intelligent agents (Gode and Sunder 1993), and in the success of simple auctions, such as the English auction, which is easy for both participants and the auctioneer, where bidders only have to decide whether or not to remain in the auction (Smith 2008: pp. 130-1).

To summarize, market design involves a division of labour. Theoretical economists propose constructivist rational sets of rules aimed at attaining efficient outcomes, and experimental economists test their ecological fitness in the laboratory, prior to their implementation in the economy. But the ecological fitness of market mechanisms can only be assessed in the real economy. Failures in implementation reveal that some of the assumed presuppositions in the rational constructivist designs are not valid and ought to be revised. Market design hence provides a further test to economists' rational constructivist theories.

The 'facts' of behavioural experiments

Behavioural experiments produce knowledge claims about human behaviour (Santos 2007, 2010b). Within this category of experiments fall individual decision-making and game theory experiments (Kagel and Roth 1995) that have studied individual preferences, the processes by which people select and apply rules, strategies or social norms for

dealing with particular individual and collective decisions, and how these decisions are influenced by the overall context of social interaction. Behavioral experiments have in fact contributed to the establishment of the field of behavioral economics, which grew with the accumulation of results from other empirical inquiries, and from other disciplines, namely from cognitive and social psychology (Camerer and Loewenstein 2004).

Behavioral experiments have been prolific in generating so-called 'anomalies', i.e. patterns of judgment and choice that are inconsistent with the traditional model of utility maximization and challenge the neoclassical assumptions of unbounded rationality, unbounded self-interest and unbounded willpower.[6] Economists have since introduced amendments to standard rational choice theory so as to account for some types of anomalous behaviour: for example, by introducing revisions to the axioms of expected utility theory, making rationality demands less stringent (e.g. Loomes and Sugden 1982), or by introducing other-regarding motives in individual utility functions (e.g. Fehr and Schmidt 1999).

An important part of this work has been devoted to accommodating 'anomalous' behaviours while maintaining formal rigor and the traditional fields of application that keep the disciplinary boundaries intact (cf. Camerer and Lowenstein, 2004). This means that if, on the one hand, economists have introduced amendments to individual utility functions so as to account for important anomalies, on the other hand, they have retained the rationality principle according to which individuals still chose so as to maximize their individual utility.

Even though behavioural experiments share with technological experiments the experimental method, the research agenda stimulated by behavioural experiments has contributed to the constitution of behavioral economics as a separate field and one to be distinguished from experimental economics (c.f. Lowenstein 1999, Smith 2008). In fact, Smith goes as far as to claim that the experimental study of individual decision-making does not belong to economics:

> In principle, as I see it, experimental markets economics and behavioral economics are complementary. Experimental economists study market performance (market rationality), incentives in public good provision and small group interactions, and

[6] Richard Thaler has had an important role introducing these results to economists in the column 'anomalies' of the *Journal of Economic Perspectives*, from 1987 to 1990. His *The Winner's Curse: Paradoxes and Anomalies of Economic Life*, published in 1992, collects some of these experimental results. See also Camerer (1995).

> other environments with dispersed individual valuations, whereas cognitive psychologists study the performance consistency (choice rationality) of individual decision making. (Smith 2008: 155)

Smith thus takes the study of individual decision-making to be irrelevant to provide understanding of economic phenomena. On his view, individual choice "is not where the action is in understanding economic performance and human achievement". The domain of economics has not changed. It is still about how "wealth is created by task specialization across individuals, groups, populations, regions, and climates", where "specialization is determined by the depth and breadth of the market" (Smith 2008: 156). Individual-decision making research does not provide guidance toward a better understanding of the specialization process that produces wealth, which does not require self-interest or unbounded rationality. The calculation process of utility maximization is a rational constructivist model. 'Anomalous' behaviour only shows that people do not follow rational constructivist models. Cooperative behaviour observed in bargaining experiments, for instance, merely shows that people do not follow strictly dominant strategies and outcomes, notwithstanding the presence of incentives to defect, drawing on their context-laden experience instead (ibid, p. 202).

Nonetheless, Smith offers a coherent account of both technological and behavioural experiments. While standard economic theory posits constructivist rationality, individuals and markets follow, at best, an ecological form of rationality, one based on culturally evolved rules of action. Rationality is the outcome of these rules which allow people through their actions achieve better results for themselves and for all. Markets, in particular, are deemed to

> constitute an engine of productivity by supporting resource specialization through trade and creating a diverse wealth of goods and services. They are rule-governed institutions providing algorithms that select, process, and order the exploratory messages of agents who are each uniquely informed as to their personal circumstances, experience, and "can do" (tacit personal) knowledge. Simultaneously, agents generate these messages once they become practiced in the institutional rules that convert those messages into realizations […] Out of this interaction between minds through the intermediary of rules, the process aggregates the dispersed asymmetric information, converging more or less rapidly to a competitive efficient equilibrium if it exists. (Smith, 2008: 323)

Reciprocity, trust, and trustworthiness “are universal mechanisms of personal exchange, where markets are not worth their cost, yet there are endless opportunities for small-scale local gains from exchange” (ibid, p. 325). Though they are present in markets, markets adapt these rules of action for impersonal exchange and codify them in property rights to act, which should not “contradict tradition and the daily practice of norms” (ibid, p. 323). However, conflict between rules of ‘personal exchange’ and ‘impersonal exchange’ may occur and may be important. While the former may create undesirable obstacles to market expansion, “the rules of impersonal market exchange may be applied insensitively to our cohesive social networks and crash viable interpersonal exchange systems based on mutual trust” (Smith, 2008: 326).

Concluding remarks

The introduction of the experimental method in economics and their use in theory testing has forced economists to recognize that science is a complex and social endeavour. Even though experimental economics possesses a fairly consensual set of common procedures, which help evaluating the validity of experimental results, the interpretation of these results, namely the implications to established theory, is often controversial. These controversies are collectively resolved within the community of experimental economists with the help of culturally evolved rules. While the extensive use of experiments in economics has dissipated the dichotomy between facts and values, it has not jeopardized the status of science. Rationality, or objectivity, in science is the outcome of the critical interactions of practitioners conditioned to socially established norms.

Experimental economics has also introduced new research agendas in economics, such as the comparative study of market mechanisms and the study of individual decision-processes. These studies have produced a vast list of stylized facts, providing an empirical base for the construction of new theories. They have also supported the proposal of various policies in the construction of new markets and of de-biasing policies that aim to tackle human error in individual-decision making. As a result, the traditional separation between ‘pure’ economics and ‘applied’ economics has become blurred. Economists have also been more open to the insights from other sciences and economics has become a more pluralistic science.

Experimental economics have exposed what Smith calls the rational constructivist character of standard economic theory. Individuals are not calculating machines, nor are markets the result of the spontaneous interactions of rational human beings. They are

instead culturally evolved intuitions. Theoreticians may, however, continue to propose rational constructivist solutions for the organization of impersonal exchange in markets. And experimental economists may test these solutions in the lab before their implementation in the field. The actual application of proposed solutions will demand further adjustments to deal with unanticipated problems and a cycle of new adjustments may issue until the new market reaches, if at all, its ecological fitness.

Yet, economics, on Smith's view, its still pretty much about markets, efficiency and rationality. It is about finding the best means to attain given ends, abstaining from discussing the ends to be pursued. This means that while experimental economics practice cannot accommodate the fact/value dichotomy, the positive/normative dichotomy remains. As far as market design is concerned, the choice among alternative mechanisms is an empirical/experimental matter, one of finding out which among the available constructivist proposals best achieves the previously established end. Individual decision processes, people's preferences or social norms need not be studied by economics. Though, the efficiency of constructivist institutions depend how these 'fit' evolved cultures.

While Smith downplays behavioural experiments, these experiments have produced evidence that point to the intricate relation between the institutional context and human behaviour, which are relevant to market design and policy-making more generally. If policies are to bring about intended results, they should be based on an informed view on how people react to a change in the set of rules. Insofar as these policies affect individual and collective outcomes, and how these outcomes are distributed among individuals and groups of individuals, these policies should also be subjected to processes of collective discussion and deliberation. This means that the legitimacy of the ends to be pursued must also be part of the discussion. This is the revolution that is still to be made in economics.

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