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Stories of Error and Vice Matter: Path Dependence, Paul David, and Efficiency and Optimality in Economics

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Abstract: History books are full of success stories. Intellectuals are interested in such stories because they are important in human history – they are important especially for those who are willing to know more about how we have reached the peak points of human civilization. History books, however, do not always credit issues of human failure and error. The social element – that is, the set of undesirable consequences of the imperfect character of human doings – are thus left out as irrelevant. Oddities and wrongheadedness, for instance, are not at the forefronts of human notice. They are seen only as peculiarities to be corrected sooner or later. Human failure and error are important as they are often left *uncorrected* in time. That is to say, we keep repeating the same errors through time. Uncorrected errors of the past sometimes generate undesirability, dissatisfaction, and disappointment in the future, because such errors prevent us from producing pragmatic solutions to practical problems in the economy and society. They prevent us from reaching “the general equilibrium.” They prevent us from getting at “the fundamental truth.” The world is, therefore, not the best of all possible worlds. The world, unlike the portrayals of neo-classical economics in general and Paul Samuelson in particular, is a world of transaction costs, as Ronald Coase argued, in the form of human failure and error. Consequences of such errors, which do not disappear easily and without causing further trouble, make the idea impossible – the idea that perfection in the world of humans is achievable. I illustrate in the paper that there are such errors in human history that cause path dependence in the economy and society. Many errors in the past, I argue, are not corrected – they linger. History is therefore not only a bunch of success stories in the form of efficiencies and optimizations. History is also the stories of error – stories of path dependence. And such errors, too, should matter for historical economists.

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[E]vil, too, has its own 'solidarity.' Error and vice are in their own way cumulative and tend to produce further error and vice in individuals as well as in nations. There is no assurance that the forces making for disruption or deterioration must cancel each other out and thus bring about their own defeat (Ginsberg. 1953: 5).

History books are full of success stories. In the stories are the Dutch fighting with the rising seawater, Wright brothers inventing the first engined airplane, Neil Armstrong landing on the moon, and John Lennon singing "Imagine." Historians are used to write such stories, and readers demand more. The business world, obsessed with greed, wants to hear stories of winners such as Bill Gates. The students of social history wondering about the Russian Revolution look for the sequence of events that led the Russian peoples to overrule the Tsar. The historians of science want to learn how Einstein came up with the idea of relativity. Intellectuals are interested in success stories because such events are important in human history – and they are important especially for those who are willing to know more about how we have reached the peak points of human civilization.

History books, however, do not always credit issues of human error and vice. For many believe there are always detectable "reasons" for the occurrence of every single human action in history – reasons through which we perform our thoughts in order to "choose more to less" or "reach the fundamental truth." When there is reason, there is no place for error and vice. They believe, for instance, that the Dutch and the British had reason to involve in the tulip trade in the seventeenth century when the "tulip mania" broke out. But can such events not be other lunacies in the past? Is there not a place for insanity and madness in human history?

In history books, the social element – that is, the set of undesirable consequences of the imperfect character of human doings – is usually left out as irrelevant. Oddities and wrongheadedness are not at the forefronts of human notice. Wrongdoings are seen only as peculiarities to be corrected

sooner or later. And many people think they are dry facts, so to speak, knowledge of which shouldn't really bother the "knower," in Deweyan terms.

The question to be asked is, Did all our ancestors do things better? No, of course, they didn't. "The Earth [was] at rest," Ptolemy thought, "[that] it [was] in the centre of the Universe, and that fixed stars move[d] together as a sphere" (Field 1981: 349). Stanley Jevons thought there was a connection between sunspots and business cycles. A great deal of economists – among them Paul Samuelson – misjudged that markets would always produce efficient and optimal outcomes. Sungook Hong reports that Guglielmo Marconi's invention of the transmission of wireless signals across Atlantic was based upon a big mistake:

A number of notable scientists and engineers joined Marconi in believing it possible for electromagnetic waves to travel over a wall of ocean, based on the current theories of the electron and ether, in which the electron was regarded as a "knot" of the electric strain in the ether. In this theoretical framework, the earth itself functioned as a sort of huge waveguide. However, it was not long before Marconi's idea of surface transmission was shown to be in error, for the electron was soon identified with real particles, and it was also shown that the earth could not guide waves as Marconi believed. We now know the electromagnetic waves that Marconi received in St. John's in 1901 did not get there by traveling along the surface of the earth, but by reflecting off the upper ionosphere (now known as the Heaviside-Kennelly layer). Marconi's achievement, based on the science of his time, was based upon a "big mistake" (Hong 2006)

Ziliak and McCloskey reported that of the 182 papers published in *American Economic Review* during 1980s 70% did not distinguish statistical significance from economic significance and 96% misused statistical significance tests (Ziliak and McCloskey 1996). They conducted the same survey for the empirical papers of the next decade, and concluded that the case was not getting better. Economists have since 1980s not ceased to make the same error. "Of the 137 relevant papers in the 1990s," write Ziliak and McCloskey (2004), "82% mistook statistically significant coefficients for economically

significant coefficients (as against 70% in the earlier decade). In the 1980s 53% had relied exclusively on statistical significance as a criterion of importance at its first use; in the 1990s 64% did.” Ziliak and McCloskey comment on the problem on her recent book, too, *Size Matters* (2007 forthcoming).

The sociological question is how such an error can persist. Or, rather, the *economic* question is why, because sociologists have less trouble than economists do – another trained incapacity – in supposing that people can persist in stupidity year after year. Economists on the contrary like to wonder why some smart person doesn’t pick up the largely denominated bill, start a new intellectual firm, and reap the profits. If null hypothesis significance testing is as idiotic as we and its other critics believe, how has it survived?

Indeed, as Mark Blaug in his *Retrospect* stated, “but equally obviously, it must be insisted, great chunks of the history of economic thought are about mistakes in logic and gaps in analysis ... [mistakes which] propelled forward by the *desire* to refine, to improve, *to perfect*” (Blaug 1979: ix). Yet, why have history books so long been stuck with the stories of *the will to perfection* despite the fact that thinkers make mistake and commit vice which are almost never corrected? Why, in other words, have we so much been obsessed with the stories of success and paid little or no attention to human error and vice that cause undesirable consequences for the future?

Charles Mackay in his *Extraordinary Popular Delusions and the Madness of Crowds* focused on manias, follies, and delusions in human history. He covered such issues as “The South-Sea Bubble,” “The Witch Mania,” and “The Slow Poisoners,” about which he wrote in 1852: “We find that whole communities suddenly fix their minds upon one object, and go mad in its pursuit; that millions of people become simultaneously impressed with one delusion, and run after it, till their attention is caught by some new folly more captivating than the first” (Mackay 1852: xv). Many haven’t noticed the stories of madness in the past, but we live by the consequences of idiocy, insanity, and irony such as those that Charles Mackay mentioned in his book.

Why are such events important? Why should we be interested in the history of error? Human error and vice are important because some of them are left *uncorrected* in time. That is to say, we keep repeating the same errors through time. And uncorrected errors of past sometimes generate disappointments about concrete situations in the future, because such errors prevent us from producing pragmatic solutions to practical problems in the economy and society. They prevent us from reaching “the general equilibrium.” They prevent us from getting at “the fundamental truth.” The world is not the best of all possible worlds. The world, unlike the portrayals of Paul Samuelson, George Stigler, and others alike, is a world of transaction costs, as Ronald Coase argued, in the form of human error and mistake. Consequences of such errors and mistakes, which do not disappear easily and without causing further trouble, make the idea impossible – the idea that perfection in the world of humans is achievable.

As William Coleman correctly points at: “Indeed, instead of moving further away (‘ahead’) from the past, economic thought has sometimes moved ‘forward into the past’ as old problems recur, and older theories live again. Thus in the 1970s slow growth of the UK economy promoted Roger Bacon and Walter Eltis to advance classical growth like diagnoses of this sluggishness: too few producers. Similarly, the war between post-Keynesians and Monetarists in the same period was reminiscent of the 1840s controversy between the Banking School and the Currency School” (Coleman 2005). And likewise, the South Sea Bubble was repeated when the Wall Street crashed in 1929. Families were torn apart at the time. People turned beggars (Mackay, 1995: 46-88; Colbert 2001: 13-14). Alchemists and fortunetellers are still alive at the present. They keep occupied the minds of many people who read astrology magazines. We have so long forgotten the business of witchcraft, but witchcraft remains (at least) conceptually in our daily lives.

There is a strong tendency that after Samuelson nobody needs Adam Smith (Boulding 1971). In fact, it is not wise to look up Adam Smith to read

the best theory of division of labor. Sophisticated versions of the theories of the nineteenth century are printed in many contemporary economics textbooks. It is a vice, however, to ignore the historical past of economic science as if there were a single path of progress headed at perfection. Economists have incorrectly assumed that whatever knowledge that economics departments produce would immediately add to the body of economic science. Some texts, which were not considered as important at the time they were first published, could come to the forefronts of the economic theory only years after their publication. Cournot's model of competition and Wicksell's theory of inflation are among the examples showing us that good ideas are sometimes completely ignored or stood out of economists' sight (Coleman 2005).

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It is an important fact that because of lack of attention, skill, and so forth, we are dependent on the outcome of such erroneous events. They keep producing undesirable consequences for the future. We, for instance, sometimes forget what happened in the past, and thus, societies collapse. Consequences are really dramatic. "Chaco Canyon Anasazi society survived several droughts before succumbing to a big drought in the 12th century AD," writes Jared Diamond in his *Collapse: How Societies Choose to Fail or Succeed* (2004), "but earlier droughts which would thus have been unanticipated because the Anasazi lacked writing" (Diamond 2004: 422). Or we may fail to perceive the problem although we face it: "Global warming takes the form of a slow trend concealed by wide up-and-down fluctuations. Temperatures around the world have been caused by humans. However, it is not the case that the climate each year has been exactly 0.01 degree warmer than in the previous years. Instead +1, +2, -4, -1, +5. With such large and unpredictable fluctuations, it has taken a long time to discern the average upwards trend of 0.01 degree per year within that noisy signal" (Diamond 2004: 425). Many of those events are the "historical small events," as economists such as Brian Arthur (1994: especially chapter II) have come to know them, which have

generated certain paths into which our civilization today is locked. They are the events that have caused the institutions to evolve dependently on a path.

Historical perspectives in the economic science that path dependence endorses are the tools to solve the problems that such traditional methods as optimization and efficiency cannot solve. Or, so it has been conceived. An incorrect but widely accepted view in the debate on the path dependence of social institutions is that path dependence is a consequence of inefficiency and sub-optimality in the economy and society. Path dependence, the established view maintains, is the consequence of inefficient calculations of engineers while building a bridge. It is the consequence of the sub-optimal decisions of the buyers in the market of mechanical keyboards or operating systems. It is always because of the miscalculation of individuals in the past, which result in undesirable and underachieving consequences today. But is it in fact so? Are efficiency and optimality always the causes for path dependence in the economy and society? Or, are there other sociological reasons such as persistence of error and stupidity?

Path dependence is about historical small events that cause undesirability today; but it isn't necessarily a consequence (or cause) of inefficiency and sub-optimality.

Herbert Simon early in 1956 argued that “evidently, organisms adapt well enough to ‘satisfice’; they do not, in general, ‘optimize’” (Simon 1956). Simon thought, as Jack Vromen writes, that the outcome of satisficing behavior will not be identical to the perfect outcome of optimizing behavior” (Vromen 1994: 155). Indeed, satisficing does not necessarily mean perfection of the outcomes of the choices – just as path dependence does not necessarily mean efficiency or sub-optimality of the outcome of the choices. What makes the two notions – that is satisficing and path dependence – resemble each other is that perfect outcomes can sometimes not be achieved. Despite the differences, I think, both point out that perfection is not always achievable by means of

optimization: inefficiency does not imply outcomes that are not satisficing. The equation goes thus: path dependence against perfection against satisficing.

Consider now an engineer working on the project of building a bridge that would make the traffic flow more smoothly in the Turkish capital city of Ankara. The objective function of the engineer is to complete the project while keeping the costs at a minimum and helping the bridge function at a maximum level. In order to achieve the objective, the engineer would use every opportunity to lower the costs and increase the functionality of the bridge. The engineer is interested in efficiency at every single step of the construction in the first place, primarily because what matters for him is to bring the abstract equation of optimization into life, therefore find a working solution to the concrete problem of the traffic in downtown.

True, efficiency and optimization are important for engineers in most cases, because *inefficiency* and *sub-optimality* sometimes prevent us from achieving the task. Engineers were correct, for instance, when they cared about achieving efficiency while building A-380 airplanes in order not to cause dissatisfaction for the passengers to fly with them. Indeed, using inputs such as concrete or steel more or less than necessary can make the foundations of the bridge vulnerable. Yet traditional methods have limitations in some cases anyway. There are such cases where sophisticated calculations of efficiency and optimization are impossible. When there are increasing returns, for instance, on which Paul David and Brian Arthur have extensively written, the goal of efficiency and optimization plays a secondary role, if any. You may complain about the “inefficiency” of Windows operating systems, but it doesn’t necessarily make you able to use other operating systems. You have to keep using Windows operating systems in order to safely connect your business network to other networks and run such application programs as Internet Explorer or Microsoft Word without problems. Or, you want to change your old expensive mobile service provider, but it may not be so smart a move after all because you may have been using the same phone number for

years and your friends and colleagues may have known you with the same number since you had your first mobile years ago.

The point here is the following: When there are “increasing returns” or “network economies” in the economy and society, such as in knowledge-based industries, the best strategy for individuals is to keep away from doing errors while taking an action – not necessarily achieving efficiency and optimality because, as Arthur writes,

You cannot optimize in the casino of increasing-returns games. You can be smart. You can be cunning. You can position. You can observe. But when the games themselves are not even fully defined, you cannot optimize. What you *can* do is adapt. Adaptation, in the proactive sense, means watching for the next wave that is coming, figuring out what shape it will take, and positioning the company to take advantage of it. Adaptation is what drives increasing-returns businesses, not optimization (Arthur 1996).

You avoid, in other words, systematic mistakes – that is, you try not to repeat the same mistake for another time. And you especially try to steer clear of errors that occur as a consequence of idiocy, delusion, and wrongheadedness. You want to keep yourself away from such errors because you have to maintain your level of individual satisfaction at *a* maximum – and *a* maximum may well be far away from *the* maximum that you can reach by using abstract equations of optimization on blackboard. Efficiency and optimization play a secondary role in here since you may not always have the chance to make the best move. That is to say, you may not be able to switch to other operating systems than Windows, or you may not want to change your mobile service provider as freely and knowingly as an engineer can increase or decrease the amount of concrete and steel while building a bridge. If you switch to another operating system or service provider, you may have taken an erroneous action. For you don't want to be unable to open the important files of your business company, all of which are written in Microsoft Word, and you don't want to lose the contact with your friends and colleagues.

Efficiency and optimality, therefore, in specific cases, are not sufficient for economists and engineers to feel satisfied about the task that they want to accomplish. Strategy choice of individuals entirely depends on the task. The goal of human action may sometimes be to build a bridge to make the traffic flow better and sometimes use an application program without running into trouble. The place of efficiency and optimality in the debate may completely be irrelevant: because the individual may not be in a situation to make a choice only with regards to the variables of marginal calculations; because there may be other variables that she cannot change – and, because, too, “small events” in the past may cause “big” consequences for the future. In such an environment, what matters is whether a practical problem is solved and whether a working solution is produced. The issues of desirability and satisfaction are what economists and engineers should rather concern about.

Arrogance of economists and historians

A very important point here, however, is nevertheless that disappointments do not always occur because of “historical small events.” “Big events,” too, cause disappointments in the form of inefficiencies and sub-optimality. It is not a surprise to know that some societies collapse; it is simply because – yes – they cannot optimize. We were told, for instance, that the German defeated the French in the WWII because of the failure of the French military preparations. Jared Diamond tells the story:

After the horrible bloodbath of WW1, France recognized its vital need to protect itself against the possibility of another German invasion. Unfortunately, the French army staff assumed that a next war would be fought similarly to WW1, in which the Western Front between France and Germany had remained *locked in* static trench warfare for four years. Defensive infantry forces fortified trenches that had deployed the newly invented tanks only individually and just in support of attacking infantry. Hence France constructed an even more elaborate and expensive system of fortifications, as Maginot Line, to guard its eastern frontier against Germany. But the German army staff having been defeated in WW1, recognized the need for a different strategy. It used tanks rather than infantry to spearhead its attacks,

massed the tanks into armored divisions, bypassed the Maginot Line through forested terrain previously considered unsuitable for tanks, and thereby defeated French generals made a common mistake: generals often plan for a coming war as if it will be like the previous war, especially if that previous war was victorious (Diamond 2004: 423).

Likewise, people fail in their lives because they make bad marriages. They sometimes choose wrong schools. Politicians lie. Undergraduate students at economics departments fail their exams because they miscalculate the marginal revenue of economic agents in the proposed question, and so forth.

The problem is the following: Economists and historians sometimes arrogantly claim that *all* disappointments today are *only* because people in the past didn't work things out efficiently. They say economic agents in the past didn't optimize well, and undesirable consequences have thus occurred. But this is wrong because, as the examples of path dependence suggests, sometimes even when the agents work things out efficiently and optimize the constraints well, they still have undesirable consequences for the future as an outcome. Arrogant treatments of many economists and historians are undue as they are like accusing women for wearing skirts, or accusing Muslims for going to mosques. True, as I argued above, there is a great score of historical cases where efficiency doesn't guide the institutional choice at all. But nevertheless past generations, to my view, cannot be accused on the basis that the failure today is only because past generations couldn't meet the requirements of efficiency and optimality. The point regarding path dependence is rather that there are many historical small events in the course of institutional evolution, causing failure and thus dissatisfaction in the economy and society. The role of such events has nothing to do with individuals' calculations as to achieve efficiency and optimality.

Jared Diamond in his *Guns, Germs, and Steel* speaks of contingent geographical and bio-geographical factors – such as “continents' different areas, axes, and suites wild plant and animal species” – as major events (that is

“small events”) affecting the prospects of societies on earth in the last 10,000 years. “The remaining factor behind Africa’s slower rate of post-Pleistocene development compared with Eurasia’s is the different orientation of the main axes of these continents,” writes Diamond,

Like that of the Americas, Africa’s major axis is north-south, whereas Eurasia’s is east-west. As one moves along a north-south axis, one traverses zones differing greatly in climate, habitat, rainfall, day length, and diseases of crops and livestock. Hence crops and animals domesticated or acquired in one part of Africa had great difficulty in moving to other parts. In contrast, crops and animals moved easily between Eurasian societies thousands of miles apart but at the same latitude and sharing similar climates and day lengths (Diamond 1999: 399).

Kenneth Arrow, in a similar fashion, has reported, relying on the Dutch historian Pieter Geyl’s *The Netherlands in the Seventeenth Century* (1961-1964), that beyond the motivations that caused the separation of the Netherlands from Belgium was the contingent and accidental set of events that had given great advantages the Protestants in the North of low countries against the sovereignty of the Spanish rule because “the convoluted sea coasts in the North provided great refuge for the rebels.”

As the Spanish regain control in the South, Protestant refugees fled to North, changing the religious balance. It was therefore because of geography that the North became the successful point of resistance and also the center of Protestantism, to the point that when independence was ceded to the North, the two areas became increasingly divergent in religion and other social attitudes. Two hundred years later, the unity of the Netherlands was reestablished by the decision of the victors over Napoleon but could not be maintained with such divergence of religion and of national sentiment (Arrow 2000).

The difference that historical small events make in the evolution of human institutions is that there is no single scientific explanation that fits to every single situation when they are in order. As historical small events play significant roles in history, “explanations” about the evolution of economic and social institutions become “historical narratives.” And such narratives are

complex and specific, in that – such stories tell us the readers – we always optimize, for instance, our shares in the exchange markets or we build the bridges in the most efficient way, but the consequences of our actions in the past still cause undesirable consequences.

Consider Thorstein Veblen's *Imperial Germany and Industrial Revolution*, in which he subscribes to the “efficiency guides all” view of reading history. The discussion figures in the recent literature, too. Veblen's discussion, in a nutshell, is about whether “technological innovations and creations of an institutional nature have in many cases [reached] their fullest serviceability only at the hands of other communities and other peoples than those to whom these cultural elements owed their origin and initial success” (Veblen 1915: 22). The story is based on whether it is more practicable to carry over a state of art from one community to another. The problem for Veblen, therefore, is a matter of efficient use of technological developments.

Germany combines the results of English experience in the development of modern technology with a state of the other arts of life more nearly equivalent to what prevailed in England before the modern industrial regime came on; so that the German people have been enabled to take up the technological heritage of the English without having paid for it in the habits of thought, the use and wont, induced in the English community by the experience involved in achieving it. Modern technology has come to the Germans ready-made, without cultural sequences which its gradual development and continued use has entailed among the people whose experience initiated it and determined the course of its development (1915: 82-83)

An economy, according to Veblen, might be left with a relatively inferior technology, or the circumstances in an economy might not be conducive to the best material interest of the system in force if a community's past habits of thought are at cross-purpose with the conditions of life afforded by the new state of industrial arts. The problem, basically, is a matter of cultural conditions in the early phases of the “life history” of any community.

Veblen's point is identical to the account of wrongly established path dependence in the sense that some of the past experiences might lead to non-optimal results at the present time. Veblen's story is about the implications of the fact that the railways of Great Britain were constructed with too narrow a gauge compared to those of American and German railway systems in the Edwardian Britain (1885 and 1950). "Silly little bobtailed carriages," Veblen argues, was an inefficient technology primarily because British coal wagons had a very limited carrying capacity. He reports that the fact was known by the experts of the time, though the remedy was not so easy to implement. The fundamental reason was that all the terminal facilities, tracks, shunting facilities, and all the ways and means of handling freight on this oldest railway system were all adapted to the bobtailed cars. The infrastructure and equipment, such as the roadbed and metal, and the engines, additionally, were not sufficient to take care of the increased traffic when some technological improvements first went into operation. It was, therefore, not without any trouble to introduce new technologies since "the chief significance of this work of improvement, adaptation and repair in this connection [was] that it [argued] a fatal reluctance or inability to overcome this all-pervading depreciation by obsolescence" (1915: 127).

Veblen's example, however, is closely scrutinized by Van Vleck who has shown that the case might not be necessarily so. She proved that British carriages were not economically "inefficient" or "irrational" but merely substitutes for more costly distribution and delivery means such as horses, hay and oats, trucks, and petroleum fuel. Small wagons, therefore, were used because they suited the existing infrastructure, but not because they were economically at the margin (See Van Vleck 1997 and 1999).

Paul David, a prominent figure in the debate on path dependence in economics, had once fallen into the trap, too. David, especially in his early writings (David 1985, 1986, 1992), adhered strictly to the efficiency-guides-all-institutional-choice viewpoint. His infamous story about mechanical and

digital keyboards, “QWERTY-nomics,” as he prefers to name it, was entirely based on the efficiency view: “During the 1940’s,” David wrote, “the US Navy experiments had shown that *the increased efficiency* obtained with [Dvorak Simplified Keyboards] would amortize the cost of retraining a group of typists within the first ten days of their subsequent fulltime employment” (David 1985). And also, David argued in the paper, “despite the presence of the sort of externalities that standard static analysis tells us would interfere with the achievement of the socially optimal degree of system compatibility, competition in the absence of perfect futures markets drove the industry prematurely into standardization on *the wrong system* where decentralized decision making subsequently has sufficed to hold it.”

Writing on the reasons for slow gains in measured productivity rates in computer industries, David also thought that approaching the issue from the perspective of economic history the so-called productivity paradox would disappear or be “found to be neither so unprecedented nor so puzzling as they might otherwise appear” (David 1990). Historical errors and failures, he argued, have caused productivity slowdowns in the computer industry. “The nature of man-machine interactions and technical problems of designing efficient interfaces for humans and computers” have prevented the engineers from optimizing efficiently.

The argument, however, that path dependence generates inefficient and sub-optimal solutions, I think, is too far-fetched – as many of his critics have already shown (Liebowitz and Margolis 1990, 1995a, 1995b, 1998 and McCloskey at an e-seminar on Eh.net in 1999). Path dependence is not always about inefficiencies. It is about errors into which we are locked in the economy and society in general, but it is not necessarily about “market failures” of capitalist market economies. Instead, path dependence is a metaphor for disappointment about the institutional matrix of industrialized economies. It is about economists’ and other scientists’ contention that

thinkers' *will to perfection* is a misleading one when institutions of network economies, positive feedbacks, and irreversibilities, and so forth rule.

David, I think, had committed the same error of assuming the triumph of the will to perfection in his early writings. Where, I believe, David went wrong was that he saw that history was full of inefficient solutions and sub-optimal calculations. His worldview was that disappointments in history were primarily caused by inefficiencies and sub-optimality that were consequences of “big events” – as opposed to Arthur’s “historical small events” – in the past. Capitalist economies, for David, were doomed to “market failures” because, he thought, inefficiency and lack of optimality were internal to the socio-economic system. That is to say, in one way or another, inefficiencies would pop up in capitalist market economies. There were big forces running human history. Examples of inefficiency and sub-optimality were characteristics of capitalist economies historically.

David responds to his critics...

Liebowitz and Margolis maintain that “the main focus and novelty of the current economic literature of path dependence is on the ‘third-degree form,’ and prominent examples in the literature feature specific claims of inefficiency ... Our reading of the evidence[, however,] is that there are as yet no proven examples of the third degree of path dependence in markets ... It is the third-degree path dependence claim that constitutes a new challenge to invisible-hand theorems that private optimization leads individuals to wealth maximizing allocations” (Liebowitz and Margolis 1998). Liebowitz and Margolis, in other words, do not think QWERTY an apt example of path dependence.

But David, after all, seems to not agree with the point *now*:

Unfortunately, the use of that phrase [of historical small events] itself is prone to cause misunderstandings. It is quite misleading to take it to suggest that some original economic irrationality or implementation error (accident) must be

implicated whenever we find that positive network externalities have given rise to a sequence that turned out to be other than a globally optimal path. Indeed, only those who are hostile to the very idea of path dependence would repeatedly insist upon a literal interpretation of the phrase ‘accidents of history.’ Doing so suggests that the essential feature of such processes is that the original actors in the drama – whether as contributors to the design of a technical system, or an institutional rule structure, or a particular form of business organization, or as the initial adopters of such innovations – had to have been acting arbitrarily, or irrationally in the context of their economic circumstances. Such an interpretation is not only logically unwarranted; it obfuscates an important but widely overlooked feature common to the histories of many network technologies, and one that has some bearing upon the way public policy might be approached in that area (David 2004).

David has long been the only one in the literature who has replied to the critics. He has taken the trouble, in a number of lately published articles, to better explicate why his notion of path dependence does not necessarily imply inefficiency and market failure. In his replies, it seems, David wants to free path dependence from the conception of inefficiency – or, better, he likes at least to unchain the two notions theoretically, without touching the original story of QWERTY in his seminal paper in 1985. It is this link which is the main source of the suspicion of many critics. What is surprising in his responses is that they are simply based on the notions of “blackboard.” That is to say, he does not provide further empirical evidence about the QWERTY case that what he meant was not inefficiency and sub-optimality – which was in fact the central point of his critics (Liebowitz and Margolis 1990, 1995 and McCloskey 1999). David does not answer the question whether or not path dependence in the QWERTY case implies market failure and inefficiency. He rather attacks on his critics by appealing to whether the critique is theoretically consistent. Consider the following lines:

In discussing the conceptualization of third-degree path dependence in which there is market failure leading to inefficiencies of an ‘irremediable’ kind, Liebowitz and Margolis ... make reference to the test of ‘remediability’ suggested by Oliver E. Williamson. But, they entirely omit mention of the important distinction that Williamson’s (1993) work drew between remediability through ‘private ordering’

and through ‘public ordering’. Nowhere in the literature dealing with theoretical and empirical aspects of path dependent economic phenomena have I found it said that this property leads to outcomes for which remediation via public ordering is wholly *infeasible*. For the state to undertake to ‘correct’ a market outcome might become socially inefficient. But that is a different proposition from its being simply infeasible. So, it is not open to the critics to claim that path dependence would have empirical or policy substance for economists if only it did not exclude the possibility of remediation by public ordering in those circumstances where private ordering was unworkable (David 2000).

The point regarding the economics of path dependence, to my view, is not to be proven by means of “blackboard economics.” Path dependence is an empirical notion – that is to say, what is important for path dependence research is why the case of QWERTY was a good example of path dependence in the economy although the case didn’t feature inefficiency at all. Liebowitz and Margolis have repeatedly asked the question: “Is it appropriate to use stories that are known to be factually incorrect in order to illustrate economic theory or teach economic history?” (Liebowitz and Margolis 1995).

Early works of David seems to not be focused on the details of such issues as efficiency and market failures. He was then primarily interested in “the quest for historical economics” – an urge to transform the future of economics into an historical social science. After the publication of the story of QWERTY (David 1985, 1986, 1992, and so forth), however, especially in the critical writings of Liebowitz and Margolis, David was forced to explicate the “real” relation of path dependence to efficiency and optimality. David, to my view, has certainly had in mind, since the beginning of his research on the economics of railways and technological innovation (David 1969 and 1975), that capitalist economies were prone to generate disappointments in the form of inefficiencies and sub-optimality. The metaphor of path dependence was merely a tool to express his mind. But facing the issues in a number of later articles, David has argued that what QWERTY story in fact told was not that network industries, under circumstances in which path dependence rules,

necessarily produce inefficiency – inefficiency, as he repeatedly noted in a number of places, was never a necessary and sufficient condition for path dependence. David has nevertheless never denied the possible connection between path dependence and efficiency. In a late publication he wrote: “Bygones are just bygones when one is concerned with economic efficiency (*as I am at this point*), rather than equity – unless, of course, memory draws the past into the present and makes it a basis for actions affecting efficiency in the future” (David 2005). He has only very recently revealed out, in the same article, what he in fact had in mind: “theatre for the unfolding of historical dramas.” Indeed, passages like below keep appearing, as he does not entirely deny the connection between efficiency view and path dependence:

To be sure, it should be recognized that among the conditions that give rise to the existence of multiple equilibria and path dependent dynamics, there are some that also would prevent the workings of competitive markets from arriving unerringly at allocations that are socially efficient in the sense of Pareto. Prominent in that company are micro-level irreversibilities in the behavior of agents, due to learning by doing and the habituation of tastes; and externalities affecting non-market interactions in the spheres of consumption and production that give rise to coordination games which end in “co-ordination failures.” Consequently, while the logical relationship between path dependence and market failure is neither one of necessity nor sufficiency, there are some important underlying connections between the two” (David. 2004).

But why is the debate about efficiency and market failure so important for David’s understanding of path dependence? One may certainly suggest many reasons. I, however, like to draw on one aspect of the issue, and comment on the rhetoric of his work on the case of QWERTY. The paper in which he introduced the case is an interesting one. For one thing, David makes several mistakes of interpreting the experiments by virtue of which it was supposedly proven that QWERTY was superior to its alternatives. The paper and story, however, have been a standard reference in the path dependence literature. It suggests that despite the mistakes he makes in the story of QWERTY, I think,

David is nevertheless a very successful storyteller. His story deserves critical scrutiny from a rhetorical perspective.

The rhetorics of the story of QWERTY

“There is an amazing irony of *rhetorical success*,” David writes, “in the inordinate attention that was captured by one specific illustration of the workings of path dependence, and the consequent significance with which debates over its factual details continues to be endowed ... The story of QWERTY provided the simplest heuristic device I could find that might provoke economists to take seriously the ways in which past events have shaped the world around us” (David 1997). The illustrative story of QWERTY is now the amblem of path dependence and the label for the claim that “history matters.” The story has been subject to heavy criticism but survived the attacks. Upon the criticisms directed at the story of QWERTY, David writes:

Indeed, in my view, the obsessive character of QWERTY-skepticism itself threatens to distract attention from the more general class of theoretical questions and empirical phenomena for which QWERTY was intended to be only a readily comprehensible symbol. To be sure, there is (by design) considerable rhetorical force in this illustration. That must bear some of the responsibility for the fact that so many economists continue to be hung up on the question of whether or not QWERTY is the best keyboard available today; and, if it isn't, whether that entails a “big” economic inefficiency, or one that should be dismissed as inconsequentially small. For scholars seriously interested in the historical development of typewriting technology this could be a reasonable obsession. But, to suppose that it is substantively crucial to any of the interesting issues that surround path dependence and its economic policy implications is just plain silly (David 1999).

David presented the article at the 1984 American Economic Association Annual Meetings, and the article – which has been the shortest among his works that David has ever got published – appeared in *American Economic Review* in 1985. The novelty of the paper, as David reports in his own “story of the story of QWERTY,” was not the originality attached to the story but the surprising response of the audience to the paper – the paper had drawn

attention and everybody had found it challenging. The *AER*, publishing articles and reviews in a wide range of specialized areas in the economic literature, is one of the most famous and influential journals in economics. It is by no means a peculiar expectation that any piece appearing in this journal would be highly recognizable among economists. The first point one should make while reading David article, I suppose, is then that he has experienced such an advantage and enjoyed the profit of being read by many scholars in economics.

QWERTY is an excellent example to draw the attention of economists to the issue. It is a very easy word to write, and it has mattered to almost everybody for some 20-30 years now. QWERTY does not make any sense, at least at first glance, for the ones who are not interested in hardware technologies. But the explanatory power of the “word” owes too much to its meaninglessness. He uses several variants of the “word” in his article – “economics of QWERTY,” “QWERTYnomics” and so forth. As Tony Lawson clearly points out,

Before briefly examining the nature of David’s explanation let me recall, in passing, how the example immediately reminds me that all aspects of explanatory endeavors are inherently interest and knowledge conditioned and motivated by conflict, surprise and/or doubt ... [I]f the letter arrangement had been ABCDEFGHIJ then many of us would not regard the phenomenon as one that is at all surprising and in particular need of being explained. Of course, even such an unpredictable letter arrangement as QWERTYUIOP is of *prima facie* explanatory interest to an ‘economic historian’ such as Paul David. To the unsuspecting mainstream economist a ready explanation is always at hand (Lawson 1997: 249).

The references of the paper deserve attention, too. Here is the very first sentence of his article:

Cicero demands of historians, first, that we tell true stories. I intend fully to perform my duty on this occasion, by giving you a homely piece of narrative economic history in which “one damn thing follows another.” The main point of the story will be plain enough (David 1985).

Could someone argue that he was mistaken in choosing the name Cicero for such a striking introduction? I guess not. Also consider the reference to Tolstoy.

But while they are, as we now say, perfectly “free to choose,” their behavior, nevertheless, is held fast in the grip of events long forgotten and shaped by circumstances in which neither they nor their interests figured. Like the great men of whom Tolstoy wrote in *War and Peace*, “[e]very action of theirs, that seems to them an act of their own free will, is in an historical sense not free at all, but in bondage to the whole course of previous history (David 1985).

The implied reader of the text is not the group of economists doing their job using traditional or established neo-classical and mathematical tools.

Surprisingly, throughout the article, the number of economic concepts he uses are not more than 20; and almost none of them are used for more than four times. (Among them only “market” and “production” are used seven times.)

Although the paper is published by a prestigious mainstream economics journal, the paper is organized in a way to which many economists are not accustomed. The article seems to address more to the economists who explain the social phenomena within a historical and social setting.

David sometimes acts as if he is more than a “worldly social scientist.” Just have a look at his concluding message:

III. Message: In place of a moral, I want to leave you with a message of faith and qualified hopes (. . .) I believe there are many more QWERTY worlds lying out there in the past, on the very edges of the modern economic analyst’s tidy universe; worlds we do not yet fully perceive or understand, but whose influence, like that of dark stars, extends nonetheless to shape the visible orbits of our contemporary economic affairs (David 1985).

I have the impression that David likes to be much more analytic and intense in his prose than other major contributors to the literature on path dependence such as Brian Arthur and Douglass North. Arthur, a trained mathematician, uses rigorous mathematical terms in his works in order to get his message to

the reader. And North is more theoretical in expressing his views. But David appears to follow a more analytic scheme when he writes and talks about path dependence. Consider the following passage from a work of David's, in which his "immediate task ... is to try to clarify the meaning and amplify the economic significance of path dependence" – a purely analytical task itself:

Path-*independent* processes may be said to include those whose dynamics guarantee convergence to a unique, globally stable equilibrium configuration; or, in the case of stochastic systems, those for which there exists an invariant (stationary) asymptotic probability distribution that is continuous over the entire feasible space of outcomes – that is, a limiting distribution that is continuous over all the states that are compatible with the energy of the system" (David. 2000).

Such analytic terms as "process," "dynamics," "stochastic", "energy of the system," "ergodic," among many others, abound in many of his works. It seems to me that his aim, in general, is to "rescue" the idea of path dependence from the hands of "mainstream economic writers" and locate it on some critical "foundations." David writes, in almost every single piece of his writings, as if he owns the metaphor of path dependence, and plays the "guard" against his critics, mainly against the conveyors of the "*laissez-faire* message of neoclassical microeconomics."

Thanks to his "tough-mindedness," David, I think, disguises his point that path dependence implies the possibility of "market failure" and "efficiency." "To be sure," David writes, "there are some underlying connections between the existence of conditions that give rise to path dependence in economic processes, and the possibility that the workings of competitive markets in those circumstances would result in allocations that are inefficient." Nevertheless, he explicitly writes, "Analytically, however, it remains a total *non sequitur* to assert that the essence of path dependence – a property defined for analyses of dynamical and stochastic processes – consists in asserting propositions regarding the possibility of 'market failure' that were proved first in the context of purely static and deterministic models" (David 2000). Such lines can be

read as corrections to David's previous works on QWERTY, but reading between the lines, the reader gets the impression that even in his replies to his critics he still has in mind that path dependence is a phenomenon that have come to life as a consequence of "big events." In fact, in the following passages of the same work, David writes,

From this vantage point, Arthur's (1989) phrase 'lock-in by small historical events' is evidently a gloss that should not be read too literally; it is a convenient contraction of the foregoing reference to the way in which trapping regions may be entered – although somewhat unfortunate, in allowing a hasty reader to suppose that the antecedent events somehow have created the local stability, or locked-in state.

To conclude: Inferiority is not the point, but error and vice are.

Under the circumstances where path dependence rules, what matter are often the issues other than efficiency and optimality. In fact, David has written that "self-reinforcing dynamics that such externalities set in motion is a source of path dependence," and it shouldn't pass without notice – especially in the "welfare economics of technology standards and standardization in the context of network industries" (David 2005). Public agents, David argues, should be aware that the targets may not be hit after a series of policy deliberations if the sequential consequences of policies suggested feature path dependent properties. Public agents perform best in influencing the future trajectories of a network technology when they know very little about what should be done. The dilemma – the "blind giant's quandary," as David calls it – arises as a consequence of

identifying the characteristics of the particular technology that users eventually will come to value most highly, and discovering if differences might exist between the potentialities that the available variants have for undergoing future technical enhancement as a result of cumulative, incremental innovation. Prescribing action guidelines for 'blind giants' is a dubious business at best (David 2005).

The best strategy for the public agent under the circumstances in which “lock-in of an inferior technology must be considered a high-probability outcome” is to keep encouraging the continuation of the introduction of new R&D technologies directed at developing new variants of the established technology in the industry. What matters most for a policy maker is then that the consequences of a series of policy deliberations may not always be “perfect” – “perfection” to be understood here in the sense of reaching *ex post* the targets that were set *ex ante*. Efficiency and optimality may be replaced by, for instance, equity, competitiveness, and novelty. For even though efficiency and optimality are achieved in way of encouraging and sustaining voluntary standard writings by individual firms in the industry, granting exclusive property rights to individuals that would enjoy market dominance as a consequence of collecting monopoly rents as “tournament prize” might eventually turn out be a story of error and vice, causing divergence from the path that was *ex ante* predicted. “As an engineering task,” David writes, “the writing of standards involves a continual interplay between efforts to be currently cost-effective and ambitions to ‘push the state of the art,’ in which it is quite natural for new designs to be proposed even when they are not meant to serve as place holders for nascent competitors” (David 2005).

Inferiority is not intrinsic or inherent to any type of technology in any business. Technologies rather become economically or socially undesirable when better technologies become possible in one of the neighboring institutional (and moral) geographies. Every happening locks the circumstances into a huge body – be it a “technological paradigm” or “institutional matrix” – the stories of which are sometimes stories of success and sometimes stories of errors and vice. As the American philosopher John Dewey once reported, “truths” in philosophy “are in fact only systematized mistakes and prejudices of our ancestors. Many of them originated in accident; many in class interest and bias, perpetuated by authority for this very reason” (Dewey 1950: 50). The irony for the innovator is that there are contingencies

in economic and social life; these can never dissolve the doubt that doing well at every single step in life does not necessarily add up to the life history of success. In fact, errors and failure are parts of what human beings do.

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