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**Bringing History into Evolutionary Economic Geography  
for a Better Understanding of Evolution**

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**Abstract:** The paper tries to construct the historical methodology for evolutionary economic geography. I elevate history to the methodological foundation of evolutionary economic geography, on which concrete research methods should be based. I explore how to evolution in economic geography by placing history in historical time and historical contexts. Accordingly, the concepts of path creation and path dependence should be used together in historical study. More important, the concept of path interdependence, which stresses the importance of the circumstances under which different processes and events are likely to occur, opens a new window on the temporal aspects of the world.

**Keywords:** historical methodology, evolutionary economic geography, path interdependence, co-evolution

# Bringing History into Evolutionary Economic Geography for a Better Understanding of Evolution

## 1. Introduction

Evolutionary approach in economic geography has drawn upon ideas from evolutionary biology and self-organization theory to understand the geographical landscape of economic change since the early 1990s. But as a young school, evolutionary economic geography has a lot to do besides making ambiguous research framework and vague concepts clear-cut. Some pre-eminent geographers devoted themselves to constructing theoretical framework (particularly associated mainly with the work of Boschma and his colleagues 1996, 2006a, 2000b, 2007a, 2007b; Schamp 2000, 2002; Essletzbichler and Rigby, 2007a; Martin and Sunley 2006, 2007), conceptual reconstruction (particularly pioneered by Martin and Sunley, 2006, for example, distinguishing “path dependence” from “place dependence”, which bears a geographical connotation) and empirical work (in the case of spinoffs, e.g. Klepper, 2001), but there is no discussion on what kind of methodology is particular for evolutionary economic geography, at least especially and extensively. Here methodology employed in this paper is more than a simple set of methods; rather it refers to the rationale and the philosophical assumptions that underlie a particular study. This notion of methodology is different from, however, partly related to Frenken’s (2007) methodology in the recent book of “applied evolutionary economics and economic geography”. The methodology of Frenken is concrete techniques of gathering and processing data, such as demographical techniques, social network, and spatial econometric techniques. This kind of methodology (which I will call “research method”) can not reflect what the researchers’ ontological or epistemological views. However, the methodology I want to make for evolutionary study is the ‘methods’ of finding ‘methods’, which can explain what are philosophical assumptions underlying the logics of theoretical exploration and the usage of research methods.

This paper firstly attempts to contribute to methodological construction by bringing history into evolutionary economics, namely trying to elevate history to the methodological foundation for evolutionary economics. This methodological issue is very important, by which we can identify whether an evolutionary study is really evolutionary oriented. The second task of this paper, related to the first one, is by what ways to understand history. In historically oriented research, all of the effects of history tend to be reduced to a single category— path dependence, which runs the risk of losing the rich contents of history. Accordingly, we need a new framework to understand the complexity of history.

The paper is organized as follows. In Section 2, I describe in a brief way the historical turn in social science and economic geography. In Section 3, I discuss the significance and necessity of bringing history to evolutionary economic geography, both theoretical and methodological. In Section 4, a modified model is put forward to make us come closer to the real history. In this new model, path dependence and path creation are combined in a single path study; moreover, path interdependence is also included in path (or history) study. Section 5 draws some conclusions.

## **2. The “Historical Turn” In Social Science and Economic Geography**

### **2.1 The “historical turn” in social science**

A “historical turn” has recently begun to emerge in the social sciences as a whole (McDonald, 1996a; Pierson, 2004), which is more or less related to the revival of Darwinism<sup>①</sup> in social science, new advances in computer science and complexity science, thermodynamics. This “historical turn” in social science reflects to some degree a rise of interest in evolutionary dynamics across natural sciences. An evidence of this growing interest in the history in social science is an increasing tendency of employing such concepts and terminologies as “path dependence”, “process”, “sequence”, “dynamics”, “mechanism”, and so on in recent literatures. The

“intellectual turn” addresses big, substantive questions of how the system (e.g. economy, or institution culture) evolve, and takes time seriously, tracing transformations and processes of varying scale and temporality, as well as specifying temporal and spatial sequences. It likewise makes an effort to bridge macro contexts (e.g. social environments, institutions) and micro individuals (e.g. firms), and hypothesizes about a time-consuming process between macro and micro levels rather than examining just one institution or process at a time. Taken together, these three features – substantive agendas, temporal arguments, and attention to contexts and configurations – add up to a recognizable historical-context approach that would make a powerful contribution to bringing our understandings of the history to the real past.

Indeed, this recognition of the importance of history and of taking time or process seriously by social scientists is not entirely new. Historical analysis approach has a long and distinguished history in the social sciences. As Mahoney and Rueschemeyer (2003: p.3) pointed out:

“Those whom we now regard as the founders of modern social science, from Adam Smith to Alexis de Tocqueville to Karl Marx, all pursued historical analysis as a central mode of investigation”.

Even when social science entered an epoch of separate disciplines in the early twentieth century, historical investigation still maintained a leading position in economy for instance, German historical school, Max Weber and Joseph Schumpeter. Schumpeter himself adopted a more historical and empirical approach in nearly all his work (McCraw, 2006), and made a plea of “Economic historians and economic theorists can make an interesting and socially valuable journey together, if they will” (Schumpeter, 1947). Unfortunately, other approaches to social sciences partially eclipse historical research after the mid-twentieth century (Mahoney and

Rueschemeyer, 2003). After some period of neglect (since the mid-twentieth century), recent two decades have witnessed a dramatic reemergence of the historical and dynamic tradition. Despite of important problems of analytic procedure and methodology, this mode of investigation has been making constant efforts to bring itself back to the center of today's social sciences.

Those insights remain now slowly penetrating into a lot of subjects in social sciences, including anthropology (Thomas, 1989), sociology (e.g. Somers, 1996; McDonald, 1996b; Abbott, 2001; Mahoney and Rueschemeyer, 2003; Saldana, 2003; Pierson, 2004, policy sciences (e.g., Howlett and Rayner, 2006), politics (e.g. Pierson, et al 2002; Robert and Tilly, 2006; Pierson, 2000), literary theory (e.g. Myers, 1998/1999), economics (e.g. Hodgson, 2001), business study (Lamoreaux, 2008) and organizational analysis (Clark and Rowlinson, 2004).

This significant transformation of the intellectual agendas in social sciences is apparent in the appearance of the “new historicism” in literary criticism and literary theory (e.g. Greenblatt, 1982; Cox and Reynolds, 1993), a revived interest in “history in philosophy”(e.g. Hare, 1988; Lavine and Tejera, 1989), a historically oriented “new institutionalism” economics (prominent scholars here would include Robert Fogel and Douglas North) and political science (e.g. Dryzek, 1998; Pierson, 2004; Thelen, 1999; Tilly, 2006), the coming back of “evolutionism” to economics (e.g. Nelson and Winter, 1982; Witt, 1993; Metcalfe, 1998), “ethnohistory” in anthropology (e.g. Thomas, 1989; Rubertone, 2000; Nicholas, 1996); “historical sociology” in sociology (e.g. Abbott, 1995; Smith, 1991), and even a more self-consciously reflexive and historicist methodological discussion in history itself (see McDonald, 1996b).

## **2.2 Historical Thinking in the Economic Geography**

There is a long and distinguished history of historical thinking in the field of economic geography<sup>②</sup>. It is not my ambition to make a detailed discussion of this tradition, since Martin and Sunley (2006, 2008) and MacKinnon (2008) have

identified the history of history thinking in economic geography, although in their work, the historical turn in economic geography and regional development sciences is equal to “path dependence thinking”<sup>⑥</sup>. Here I just outline the main theoretical approaches that have ever involved into this wave of the “historical turn”.

In the 1950s and 1960s, Myrdal, Hirschman, Kaldor and others explained uneven spatial development through the concept of cumulative causation, under the influence of Thorstein Veblen (O’Hara, 2002; MacKinnon, 2008). Research on industry life cycles (see Chapman, 1992), which was enlightened by the product cycle model (Vernon 1966), could be probably included in this wave as well. Marxist economic geography in the 1980s is worth mentioning most, since this school views uneven regional development as a historical process. Massey (1984) argued that new spatial divisions of labour result partly from economic imperatives, but more importantly from broad changes in social and political struggle and transformation; and that the legacies of its past exert an influence on the present and future development (see, Martin and Sunley, 2008). Inspired by Marx’ concept of “surplus capital”, Harvey used (is still using) a similar terminology of ‘spatial fix’ to explain the instability and geo-political dynamics of capitalism based on his approach of “historical-geographical materialism” (Harvey, 1982, 1985, 2006).

There are two contemporary schools, which devote to understanding an issue of history importance in economic landscape. One is in economics, ‘new geographical economics’ (NGE), associated particularly with the economist Paul Krugman (for example, Krugman, 1991a; 1991b). The other is evolutionary economic geography, which is fundamentally different in basic standpoints from the former. Advocators of new geographical economics claim to recognise that ‘history matters’ in regional convergence and divergence process and in their models incorporate notions of path dependence, increasing returns as well (for a more detailed review, see Martin and Sunley 2008), Krugman himself also argues that History matters. He emphasizes the role of history in the sense of initial location patterns which then become locked in by path-dependency generated by processes of cumulative causation:

“The long shadow cast by history and accident over the location of production is apparent at all scales, from the smallest to the largest ... this clear dependence on history is the most convincing evidence available that we live in an economy closer to Kaldor's vision of a dynamic world driven by cumulative processes than to the standard constant-returns model” (Krugman, 1993, pp. 9-10).

However, it is worth pointing out that history is an abstract notion in Krugman’s formal models of urban agglomerations or regional production systems. At the same time, Martin and Sunley have pointed out that this also means there is little attention paid to history in the sense of change and development:

“He claims that the same broad locational forces which explain the growth of nineteenth-century concentrations also underlie the continued tendency to agglomeration. Indeed, this is one reason why he is reluctant to emphasize technological spillovers as a key determinant of contemporary clusters.” (Martin and Sunley, 1996, p.269).

Furthermore, new geographical economics still retains much of the conceptual apparatus of mainstream (orthodox) economics, requiring explanations based on methodological individualism, full information, utility-maximizing individuals and profit maximizing firms<sup>④</sup> (Scott, 2006; pp.60; also see Martin 1999). Accordingly, Krugman’s approach can best be considered as a recent extension of neoclassical thinking to explain trade, specialization and agglomeration, relaxing the frequently used assumptions of perfect competition and constant returns to scale (Boschma and Frenken, 2006), and acknowledging the importance of history.



Evolutionary economic geography can be seen as part of the “historical” turn in social sciences. This new economic geography school theoretically derived from evolutionary economics and complexity science (Boschma and Martin, 2007), making efforts to better understand uneven development and adaptive transformation of the economic landscape over time, by blending Nelson and Winter’s evolutionary theory of the firm, Generalised Darwinism based on the evolutionary principles of variety, selection and retention (Essletzbichler and Rigby, 2007b), concepts such as path dependency (Martin and Sunley, 2006), and self-organisation of complexity theory (see, Martin and Sunley, 2007). Evolutionary economic geography, based on more real agent assumption of bounded rationality, tries to understand the historical far-from-equilibrium process or dynamics of changing economic landscape. Despite institutional and relational economic geography also admit the importance of history in formation and change of institutions and social networks, understanding the dynamic process of economic landscape is not a main focus of their theoretical questions. Hence, in this sense, evolutionary economic geography would be the only school in economic geography, which really contributes to understanding a historical process of changing economic landscape. Furthermore, bringing history into economic geography would be of great importance, both theoretically and methodologically, even for policy implications.

### **3. Bringing History to Evolutionary Economic Geography**

#### **3.1 The Study of Evolutionary Processes Needs History**

Evolutionary economics as a heterodox economics focuses on the process of economy instead of its final results, borrowing some biological metaphors and other natural sciences and employing population thinking and systematic thinking. According to Hodgson’s ‘NEAR’ criterion of evolutionary economics, the most important benchmark for evolutionary economics is novelty-embracing and

anti-reductionist (Hodgson, 1997). Novelty (innovation) is the fundamental force driving the change of economy. Thus evolutionary economists participate in a research on issues and field related to innovation, for example industrial evolution, national innovation system. Economic geography, as the field of study that deals with the uneven distribution of economic activities in space, surely made an attempt to apply evolutionary economics into economic geography, and contributed our understanding of changes in economic landscape.

Evolutionary economics focuses on the processes rather than consequences (Witt 1993, Shiozawa, 2004). Witt (2002, p.10)<sup>⑥</sup> summarizes the main characteristics of evolutionary economics. In my opinion, some of them can be also applied to evolutionary economic geography. These characteristics are as follows: (a) historical: it deals with historical processes and transitions from one state to another over time which are irrevocable and path-dependent (Witt, 2002, p.10), (b) dynamic: this means that an evolutionary explanation needs to identify units of transmission, source of variation, mechanism and process of transformation, and source of isolation (Durhan, 1991, p.22). For economic geography, but another characteristic should be added: (c) geographical, different from evolutionary economics who ignores the dimension of “geography” of the evolution of systems on a large extent (with the exceptions of a few innovation system scholars, for example, Lundvall, 1988), evolutionary economic geography “takes history and geography seriously by recognizing the importance of place-specific elements and processes to explain broader spatial patterns of technology evolution” (Essletzbichler and Winther, 1999, p.180). In other words, it is very necessary to situate evolutionary approach in economic geography in (a) “being historical”, namely, longitudinal time series of changing events under survey is the first necessary condition for evolutionary economic geography, (b) “being geographical” is the second one, and (c) “being dynamic” is the sufficient condition. Thus, we can see that being historical is quite indispensable to evolutionary study.

### **3.2 Significance of Bringing History into Evolutionary Economic Geography**

The significance of bringing history into evolutionary economic geography lies in at least three aspects. Firstly, history is one of main intellectual sources, for both theorists and policy makers. As Schumpeter warned us as long as 50 years ago:

“Nobody can hope to understand the economic phenomena of any epoch, including the present, who has not an adequate command of historical facts and an adequate amount of historical sense or of what may be described as historical experience.” (Schumpeter, 1954, p. 12).

At the same time, history can allow us to see how economic change occurs through the changing relationship of economic and non-economic variables; the inspiration from history could be useful when we are confronted with the uncertain future;

Equally important, bringing history into evolutionary economic geography is meaningful for the methodology. Methodology here refers to more than the rationale and the philosophical assumptions that underlie a particular study and data collections, rather than specific scientific methods. The issue is more or less associated with an endless argument where theory explains fact and fact tests theory by way of logic, which connects them as premise to conclusion. Diversified theoretical approaches and analysis tools can co-exist in evolutionary approach, but both of them should be built on a fundamentally unified methodology. Methodologically, historical research method is the first and foremost important, at least one amongst others<sup>®</sup>. In short, the quest for change and transformation of economy should be based on the utilization of historical evidence, but focus on a dynamic process. Accordingly, I believe that bringing history into economic geography could make a valuable contribution to the methodological construction of “historical” or evolutionary economic geography.

### **3.3 Research Methods in Evolutionary Economic Geography**

Evolutionary economic geography deals with issues regarding spatial evolution over time at micro, meso and macro levels. While rooted in economic geography, partially in economics and social economics, it calls for analytical innovations to better grasp the specificities of spatial changing process of different levels over time. This process is no doubt super-complicated. This is why evolutionary economic geography relies on a combination of many research methods (Boschma and Frenken, 2006a, 2006b). The literature pools a wide set of very different contributions, including in-depth case studies (Garnsey and Heffernan, 2007), social network analysis (Glückler, 2007; Boschma and ter Wal, 2007; Giuliani, 2007, 2008), spatial econometrics (Essletzbichler, 2007; Rigby and Essletzbichler, 1997), data envelopment analysis (Jacob and Los, 2007), complexity theory (Sorenson et al., 2007), and gravity modelling (Maggioni and Uberti, 2007) etc.

Different from their economic colleagues who reject the trend of too much mathematics (mathematical formalization in economics), evolutionary economic geographers seem to open all research methods, including mathematics and modeling with hands. However, such a massive hybridization of multifarious methods has left evolutionary economic geography rather than analytically adrift. The direct applications of research methods without any reflective consideration are not unproblematic, thus geographers should apply and use them with caution, which is similar to apply evolutionary concepts into geography. In fact, the reconstruction of research methods is equally important as the theoretical remaking of evolutionary concepts, as in the case of the conceptual remaking. What I want to argue here is that since no research method is a panacea, diversified research methods for evolutionary economic geography are necessary and important, but these research methods should contribute to understanding history, namely, they should be “being historical”.

### **3.4 Methodological “Being Historical” for Evolutionary Economic Geography**

To address the question of what is historical methodology I use here, we need to distinguish between historical methodology I employ here and historical method; they are partly related to each other but in fact are quite distinct concepts. The distinction would be useful for understanding what kinds of study under the label of evolutionary or historical is evolutionary economics or a really historical study in social science more generally. The historical method here refers to the concrete techniques by which historians gather data (primary sources and other evidence) in quest of history. However, historical methodology I am interested in here is more than a simple set of methods; rather than it refers to the rationale and the philosophical assumptions that underlie a particular study. The historical methodology is associated with the two problems of what does history mean and how history is incorporated in economic model, because the historical evidence is never conclusive. Historical fact does not prove theory. True-explanation is always hypothetical and fact is observed in light of theory. Despite the “under-determination of theory by evidence”, however, science gets results in conformity with ground rules of method.

#### **(1) Defining history**

Ruth Berins Collier and Sebastián Mazzuca (2004, pp:473-374) summarized that time has four notions, taking history in political analysis as instance: first, history as *period* refers to the fact that phenomena are located within some socially defined interval of time; second, history as *conjuncture* refers to a temporal coincidence of a potentially limitless number of forces, actors, structures, and events, including the accidental and the contingent; third, *timing*: the fact that phenomena may occur in different sequences and with different temporal spreads; A fourth temporal idea involves *change over time*: the unfolding of a series of different but interconnected events; the longitudinal trajectory of single factors; and the speed of a process or change.

#### **(2) Being in Historical Time**

More important, the term ‘historical’ in historical analysis does not refer to the particular, the space–time unique event that is explored in its totality; it refers instead to historicity in a sense that recognizes the fundamental historical character inherent in economic phenomena, which is common with German Historical School. The distinction is not one between history and theory, but rather one between ahistorical study and historical study (see, Dopfer, 2001, p. 162).

Despite some ahistorical study has time point of historical events and temporal period that can be measured in time between any two components in the sequence, this kind of study cares less about the temporal and causal ordering of phenomena unfolded over history, namely *longitudinal trajectory* that tracks change of a single factor over time. This could be related to the temporal viewpoint of anti-historical study. In the ahistorical study, all points in time are treated the same (temporal homogeneity), and disconnected from all other points (non-history dependent). This is what Robinson defined “the logical time”. In her contributions to time-in-economic-theory, Joan Robinson (1962, 1979) made a distinction between logical and historical time, addressing the problem of interpreting the historical process of accumulation as a movement from one equilibrium position to another, a sequence of equilibrium positions, or a progression along an equilibrium path (Harris, 2005, p.93). In reference to the process of economic modeling, she claims that, ‘in a model depicting equilibrium positions there is no causation. It consists of a closed circle of simultaneous equations. The value of each element is entailed by the values of the rest. At any moment in logical time, the past is determined just as much as the future’ (Robinson, 1962: 26).

That is, in logical time, the “tomorrow” is always like the “past” and known for certainty (*temporal homogeneity*). Therefore, decisions taken “today” in anticipation of future events are always confirmed by future events (historical determinism). Robinson (1980, p. 219) points out, however, ‘today’ is influenced, but not completely bound, by the past. Any action or decision taken today is either the result of blind habit and convention or is directed towards its future consequences, which

cannot yet be fully known (history-dependent but not fully determined by history). The viewpoint mirrors her idea of “historical time”<sup>⑦</sup>:

“In an historical model, causal relations have to be specified. Today is a break in time between an unknown future and an irrevocable past. What happens next will result from the interactions of the behaviour of human beings within the economy. Movement can only be forward.” (Robinson, 1962: 26)

In historical time, the 'arrow of time' points only one way (irreversibility). In historical time, there is strictly one-way traffic; time moves forward; events occur in a uni-directional sequence in which '[t]oday is a break in time between an unknown future and an irrevocable past' (Robinson, 1962, p.26). At any instant, the past is irrevocable and the future in some sense opens (Curry and Barnes, 1988, p.146). Furthermore, any event occurring in the present exists in the context of a given and immutable series of prior events corresponding to the periods, which make up the past (history-dependent) (Setterfield, 1995, p.3), and also is contextualized by the current conditions. What has gone before sets possibilities, but the current makes one occur.

### **(3) History as Context**

Historical study, just as Dopfer (2001, p. 161) addressed evolutionary analysis, is not truly 'history friendly' if it refers to context. Context could be understood as that which “surrounds” a single phenomenon. Therefore context is distinct from the single phenomenon itself, which can be seen either as a single event and a process or a causal relation. This brings another question: which specific contexts in how far temporally could be considered context in the strict sense of surrounding?

Table 1. Logical versus historical time

	Logical Time	Historical Time
Directionality Of Time	Reversibility	Irreversibility, One-Way, Move Forwards
Nature Of Time	Homogeneity	Heterogeneity
Time Intensity Of Action	Instantaneous	Discreteness, Lags, Inertia
Expectations	Correct Foresight	Future Unknowable
Change	Disembodied	Embodied Path-Dependent
Equilibrium Or Dynamic	Equilibrium	Dynamic

Source: modified from Harris (2005, p. 98)

Why need to take context into consideration in understanding the historical phenomenon of primary interest might be premised on the idea that economic events are dependent on initial and boundary conditions, that are, in turn, influenced and shaped selves by those events (Dopfer, 2001, p. 163). Economic phenomenon or process should be understood as the thing occurring in many discrete space and discrete time contexts (spatio-temporal heterogeneity), not in homogeneous space or homogeneous time (Potts, 2001). Even contingent event is not determined by chance but has an inherent dynamic that must be recognized as endogenous to its historical nature.

Here we should note that history as context not only puts emphases temporal particularity, but also refers to a place- specific particularity of phenomena. Here the place is not only a point on the globe having a distinct material endowment, but also, or more important, a place with different culture, and institutions (e.g. politic-economic regime).



To sum up, evolutionary economic geography, evolutionary economics as well, not only requires time, the temporal period of historical phenomena, but also needs historical time and contexts surrounding historical phenomenon. The historical study can be regarded as a true evolutionary or historical study only if it emphasizes historical time and in the quest for the causation of historical events.

#### **4. Understanding Historical Evolution**

##### **4.1 “History Matters” Cannot Be Reduced To “Path Dependence”**

It seems that “history matters” has become a widely-used concept across a wide range of academic literatures, mostly through the notion of “path dependency”, and maintained the importance of history. History however, in economic processes or more general systems, does not always matter (David, 2001), at least not in the same ways. Furthermore, how much ‘importance’, as (David, 2001) has already said, should be attached to the particular category of path dependent dynamical processes, in the sense of what proportion of the changes. That appears to call for an examination of the degree of “historicity”, i.e. of the strength of the influence of the past in economic dynamics. David (2001) coined several terminologies of “weak history”, “moderate to mild history”, and “strong history” (see also Castaldi and Dosi, 2006). Which one of the foregoing 'degrees of historicity' can be applied to which phenomena in which part of history, is an untouched issue so far, both theoretically and empirically. More interesting for geographers, these seemingly similar historical events are very important for a specific region, while it means nothing for others. For example, there are numberless military research and technology stations all over the world, but merely a few regions with a long root of military technology have become hi-tech company clusters, and the most famous among which is Silicon Valley in San Francisco Bay Area (cf. Saxanian, 1994).

Actually, this unsolved question is associated with a fuzzy concept of history, namely of “what does history mean”, which I discussed above. Here, I want to

criticize that a dangerous trend that some authors use path-dependence to define simply “history matters”. In fact, “history matters” is much richer than this concept of “path dependence” in meaning. This raises another question, by what ways history can be examined through path study? I would like to argue that, first we should combine the concept of path dependence with the path creation notion to understand the path evolution of entities, but this kind of path study can not address the issue of the interactive relation of entities and their surroundings, while path interdependence can do.

#### **4.2 Main arguments and challenges of path dependence theory**

Work on the concept of path dependence has been stimulated by Paul David’s long-term interest in seeking to understand technological trajectory, and also by Brian Arthur’s studies on non-linear economic processes.

In his seminal work, Paul David (1985) illustrated through now-famous case of the QWERTY typewriter keyboard that some new sub-superior technologies, for idiosyncratic and unpredictable reasons, can achieve an initial advantage over alternative, even more effective technologies, even if in the long run the alternatives would have been more efficient. This domination of sub-superior technologies is probably linked to several and interrelated sources of feedback and reinforcement, namely, what David called QWERTY-nomics or Arthur’s various forms of increasing returns in generating path dependence in the economy (1994a,b).

In the mode of path dependence, both Paul David and Brian Arthur, together with other proponents<sup>®</sup>, highlight the importance of small, historically contingent ‘accidents’ or ‘chance events’ which can have long-run effects on the future path of economic technologies, organizations and system. A clear logic is involved in strictly defined path dependent processes: once entered upon at a “critical juncture”, a path generates self-reinforcing or positive feedback processes (“increasing return effects”) that will stabilize and entrench it, turning it into a deterministic frame.

Path dependence provides a unique and fertile analytical framework able to explain and assess the ever-changing adaptation process, by characterizing economic action in a dynamic perspective, which is able to appreciate the role of historic time. So, it should be considered as one of the most fruitful concepts within the field of evolutionary economics (Brandes et al., 1997). But the concept is based on problematic simplifications (Sydow et al., 2005; and Meyer and Schubert, 2007), so it confronted (and still is receiving) much challenges and criticisms.

The first is associated with the philosophy of small or random events. The path-dependent character gives rise to the debate on the influence of chance versus necessity (see e.g. Kwasnicki 1994). But path-dependence seems to go an extreme. The small event may actually be not so small and not so random and innocent after all (cf. Bassanini and Dosi 2001). Moreover, path dependency scholars mostly view the emergence of novelty and new pathways to be serendipitous. It might be true that in some cases, for example, the discovery of penicillin or the inspiration for Silicon Valley was chance event, whereas as a general rule reliance on random chance is not a good enough explanation for the creation of new pathways.

Indeed, this problem is related to the second one, namely, path dependency concept does even leave less space for the transformation of path itself. Classic path dependence scholars also acknowledge the possibility of change, but hold it to be essentially rare and occurring in radical ruptures, namely, once a path is locked-in, and remains largely unchanged, path transformation is presumed to be highly unlikely except through rare radical ruptures or reorientations, which are often associated with violent external shocks. (Djelic and Quack, 2007). That means path breakthrough is wholly exogenous in this model of path dependence, and tends to grant little sense of agency to actors once a particular trajectory has been set in train (Grabher, 1993; Hassink, 2005).

At last but not least, path dependence, the highly condensed concept of history importance, cannot so well reflect the richness of history, partly like what Sewell said “what has happened at an earlier point in time will affect the possible outcomes of a

sequence of events occurring at a later point in time” (Sewell, 1996, p. 262). In much of path dependence literature, the historical study on the historically complicated causal relationship was too much simply reduced to study relatively deterministic chains of temporally ordered and causally ordered events, namely small events at critical junctures, and what Mahoney defined self-reinforcing sequences and reactive sequences (Mahoney, 2000)<sup>®</sup>. I believe that, due to this kind of highly reduced focus, path dependence theory simply traces a specific set of historical events, mostly by ex post facto artificially imagined causal relation (which I want to call a single path study), which in turn results in the losing of something meaningful, in particular, the neglecting of the impact from the contemporary settings on historical events (similar to the concept of path interdependence of Martin and Sunly, 2006).

In short, path dependence is a strong concept tool of “historical economics”, but it tends to focus on mechanisms that anchor and stabilize trajectories while paying less attention to the sources and mechanisms of change. Moreover, this concept does not discuss the role of moving surroundings of entities. Consequently, we need other concept make us be closer to the real reality and history. Probably, path creation and path inter-dependence are good choices.

#### **4.4 Path Creation and Path Inter-Dependence: Complementary to Path Dependence**

These concepts emerged in criticism on path dependence, and the most brilliant amongst them are path contingency and path creation. The very concept of path-dependency provides much less insight into regional adaptation and adjustment than path-contingency by Ray Hudson. The concept of path contingency “captures the character of the growth process, and in particular the transition from growth to decline, more adequately than does that of path dependency” (Hudson 2005: 583). This concept better expresses the possibilities of moving between as well as along developmental paths (Hudson, 2003; Hardy, 2002), but did not provide much

knowledge about how to create a new path. Perhaps the notion of path creation developed by Raghu Garud & Peter Karnøe (2001) can fill this gap.

The concept of path creation by Raghu Garud and Peter Karnøe (2001, 2003) makes a significant shift from "describing our past worlds" (the way of path dependence conception) to "shaping our current states" (the ways of path creation notion) to create new futures. The creation of a new path perhaps benefits from conscious strategic choices, deliberate and mindful action of action of action, as what Garud and Karnøe term 'mindful deviation', particularly of entrepreneurs. In this model of path creation, entrepreneurs are imagined as a powerful actor who can intentionally exercise strategic actions. In the process of deviating mindfully to create new paths, on the one hand, entrepreneurs dismember themselves from the existing cognitive structure (path de-dependence), through overcoming their long-formed habits and cherished beliefs; on the other hand, they reframe their thoughts and actions around what will benefit the new path, what will advance it forward.

The recently developed theory of path creation reminds us again the role of human agents in creating new paths (e.g. of economics, institutions) after the popularity of path dependency in social science. The role of intentional and strategic action has a much longer genealogy, at least track to the work of Marx, Veblen, and Schumpeter, for example, Schumpeter' Creative Destruction. It is important to stress that a Schumpeterian entrepreneur is not an inventor, but an innovator (of new products, processes, organization mode and so) (McCraw, 2007). Accordingly, we can say that Schumpeterian entrepreneurs function a role as new path creator. Without these new path creators, capitalism would lose propulsion.

According to the principle of "history as contexts", evolutionary or historical study should place system in real time, i.e., construct temporally joint "moving" pictures of events and surroundings rather than "snapshots", meanwhile, place more attention to interacting relation of enteritis and their surroundings over time. Technically, historical contexts can be explored through understanding overlapping multi-paths and interaction amongst them over time. So it is safe to say that the shift

from a simple evolutionary perspective of change along a given trajectory (single path evolution) to the co-evolutionary thinking in which evolution is understood as an interactive change of one trajectory dependent on others (path interdependence, or co-evolution of paths) can vastly enrich our understanding of complex social dynamics.

The more recently developed co-evolutionary theory (e.g., Nelson 1994<sup>®</sup>, Witt 1997, Helfat 1994, Lewin and Volberda 1999, Rodrigues and Child 2003, Volberda and Lewin 2003) would be useful for understanding the complex path interdependence process. According to Murmann's book about the co-evolution of firms, technology, and national institutions (2003), co-evolution is "two evolving populations co-evolve if and only if they both have a significant causal impact on each other's ability to persist" (Murmann 2003 p.210). The keywords to be underlined here are multidirectional causalities between micro- and macro-coevolution, as well as between and across other system elements.

The concepts of path inter-dependence or co-evolution (amongst multiple paths) extend standard path evolution study to multi-specific interactions between two or more populations, in which the fitness of evolving solutions depends on the state of other coevolving entities rather than a fixed evaluation function. It is becoming increasingly obvious that single-theme explanations for change and/or non-change of a single population, such as the concepts of path dependence and path creation (which I term "a single path study"), have reached their limit and evolutionary scholars should adjust research strategies and take into account all interacting populations of organizations and environments where organizations survive, compete, and change.

Coevolution, together with the concepts that derived from it such as mutual adaptation (co-adaption), becomes a powerful tool for inherently interacting populations. Different from a single-path study in which a certain population is often seen as an isolated entity but the environment as parametrically fixed one, co-evolutionary study emphasizes more on the interaction between genetically distinct populations and between the population and environments. The concept reflects well

the world viewpoint that the world is complex, human cultural and social behaviours are not predictable and human behaviour is dynamically linked to its environment on a range of temporal and spatial scales (Winder et al, 2005, p.355).

There are at least two ways of understanding path interdependence for economic geographers (Schamp, 2008; Marin and Sunley, 2008). Firstly, path interdependence involves interactions between industrial paths, as what Schamp term “the co-evolution of two firm populations”. As we know, economies are typically ensembles of overlapping sets of inter-related sectors (Metcalf et al, 2007, also see Marin and Sunley, 2008). Secondly, path interdependence in a regional context would be interactions between different socio-economic “arenas” , including what Schamp calls “the co-evolution of populations of firms and institutional arrangements”, and interaction between the boarder local economic, technological and socio-institutional systems, and interaction between multi-geographical scales as well. Economic geographers have been interested in the phenomenon of co-localized firm (e.g. today’s industrial cluster), but at present, there is few empirical investigations on these kinds of path interdependence so that we have little knowledge about how far they can effectively change the course of an industrial path, possibly by spinoff and the rise of market niches, and subsequently co-adaption between marktett, technology, industry, and institution. Therefore, studying on the path-interdependence should be on the research agenda of evolutionary economic geographers as soon as possible.

## **5 . Conclusion**

The turn of historically orientated study has recently begun to emerge in the social sciences as a whole. The historical thinking in the field of economic geography also has a long and distinguished history. The new school of evolutionary economic geography also tries to contribute to understanding change and non-change of economic landscapes over time from the underlying industrial dynamics of firms (Boschma and Frenken, 2008), drawing upon ideas from evolutionary biology and

self organization theory. Evolutionary economics geographers seem to be busy with theoretical framework construction and conceptual rebuilding; there is little discussion on another basic question of “what is history”, and a sequent question of “how to understand history”. Better understanding of history really does lead to a better understanding of evolution in economic geography, at the same time, can help us to identify the really evolutionary study from articles merely with the label of “evolution”. So I argue that history not only nourishes evolutionary economic geography through offering historical evidence, but also needs to be upgraded to the methodological foundation for evolutionary economic geography. Although some evolutionary studies in economic geography have used the evolutionary principles, they are not real evolutionary unless employing history. What I want to emphasize is that we should place evolution in economic geography in historical time, not only logical time, but also in historical contexts.

Moreover, the principle of “history matters” is widely acknowledged, it tends to be reduced to the often-invoked but rarely examined concept of “path dependence”. However, according to the classical path dependence theory of David-Arthur, the existing path won’t be changed except for being impacted by external shock (exogenous path creation). Thus, the role of purposeful, deliberate and strategic human action has been ignored (e.g. Schumpeterian Innovation in creating new path, namely endogenous path creation). Accordingly, human deliberate action should be added in path study. Furthermore, the meaning of events or processes is frequently distorted when they are ripped from their temporal context. Hence, we should construct temporally joint “moving” pictures of events and surroundings rather than “snapshots”. Hence, history should be understood as contexts, which can be explored through understanding overlapping multi-paths and interaction amongst them over time. Path inter-dependence or co-evolution amongst multiple paths can vastly enrich our understanding of complex social dynamics, since the concept of co-evolution explores a range of important features and implications of evolving socio-economic processes that unfold over significant periods of time (which we might call “path



study”, including path dependence, path creation, etc.), and above all, contributes to understanding of the importance of the circumstances under which such different processes are likely to occur (which we can term “path-interdependence”). From this point, path inter-dependence or co-evolution (amongst multiple paths) can vastly enrich our understanding of complex social dynamics.

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① Since Darwinism was mistakenly regarded as the natural theoretical base for notorious racialism, it has been rejected for a long time after World War II.

② Because of the fuzzy boundary of economic geography is and the strong influence of some economics (for example development economics in 1950s, and New Economic Geography pioneered by Krugman) on economic geography, so the term of economic geography I use here include “economic geography”, development

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economics to some degree, regional science and other subjects that study spatial and geographical issues of economic activities. As to New Economic Geography, I totally agree with Martin that New Economic Geography's models (the work of Krugman as representative) are better characterised as economics than as geography (Martin, 1999), actually Krugman never claim that himself is a geographer, but considering that New Economic Geography also deal with geographical issues, for instance, economic agglomeration in geographical space, and the core-periphery structure of the global economy (see Fujita and Krugman 2004), and deepened our outstanding, it would be included.

③ Evidently, the problem of the replacement of “history matters” by path dependence study is associated with a fundamental question of “what is history” and “can historical study be reduced to the path study”. Briefly speaking, my argument is that path dependence study is merely a small piece of the grand field of history-oriented research. I will go back to this problem later.

④Caterina Marchionni distinguished between realism and realisticness and argued that despite of the above mentioned “unrealistic assumptions” of geographical economics, their representations of the core of real-world phenomena might nonetheless be approximately true (Marchionni, 2004, p. 1742). Marchionni, Caterina (2004), Geographical economics versus economic geography: towards a clarification of the dispute, *Environment and Planning A*, 36(10) 1737–1753. What is I have to say is that the attitude of economic geographers to new economic geography should be more tolerant, not acridly captious and endless attack, because new economic geography is the only friendly field in economics to geography which attempts to incorporate the role of space into conventional economics. A friendly and tolerant dialogue atmosphere in which distinct theoretical, methodological and epistemological genres can be accommodated is conducive to deepen our understanding of the geography in economy, which is a joint mission of economists in new economic geography and geographers.

⑤ Besides the previous two characteristics I quote here, an addition one in Witt 2002 work is self-transformation explaining—in that it includes hypotheses relating to the

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source and driving force of the self-transformation of the system. But my argument for this point is Because a part of evolutionary economist employ biological analogy, the system thinking can not be viewed a common feature that all branches in evolutionary economics share.

⑥ In addition, it is worthy to note that this principle of “no one fits all” can likewise be applied to methodology. Methodology should be diversified. The reason of the decline of German Historical School in the Methodenstreit with Carl Menger and the Austrian School at the end of the 19th Century is that German Historical School fell in absolutism that historical research method has absolute advantage over others.

⑦ The historical time in economic theory has a long and reputable history. An interest in the implications of historical time can be found in Austrian, Mamian and Institutional economics, Keynes and the Post-Keynesian school (Setterfield, 1995). Perhaps, it is true that no model can be truly faithful to being historical in a strict sense, partially because all models involve some level of abstraction, while history is so complicated that it is not impossible to be abstracted and decomposed, so all are unrealistic by definition. Nevertheless, some models may be less unrealistic than others by virtue of the types of abstractions they make, and also less ahistorical.

⑧ But they have difference, in a strict sense. For example, as Thelen pointed out that David (1985), especially, emphasizes chance elements (p. 332) and essentially random factors in determining among an apparently very wide range of possible outcomes (p. 335), while Arthur (1989) is overall more circumspect and nuanced.

⑨ Mahoney (2000) developed two types of path dependent sequences: ‘self-reinforcing sequence’, and ‘reactive sequences’. The former is characterized by the formation and long-term reproduction of a given institutional pattern, which often demonstrate what economists call ‘increasing returns’. The latter are chains of temporally ordered and causally connected events. This kind of sequence is reactive in the sense that each occurrence within the sequence is a reaction to an earlier event.

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Thus, each step in the chain is dependent on prior steps, similar to the sunk cost approach.

⑩ Although Nelson and Winter did not make explicit use of the notion of path dependency, their term of “natural trajectories” with regard to technological change has similar connotations.