

Towards a "Planned Path Emergence" View on Future Genesis*

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Abstract

In this paper, path dependence theory, path breaking, and path creation are discussed in order to provide an additional view to the study of future technological, economic, social, and organizational change. Path dependence theory can be ascribed to both contingent and deterministic views of change, whereas path breaking and path creation stress the voluntaristic influences actors have on changing and shaping paths. By contrasting these theories, and based on the idea of restrictive indeterminism, a midway approach called planned path emergence is suggested as a realistic view.

Keywords: path dependence, path breaking, path creation, theory of change, theory of future genesis, restrictive indeterminism

Introduction

Path dependence theory is widely discussed in technology, economics, social institutions, and organizations – all of which are topics analyzed by futurists. Coming from the general insight that history matters, it explains the formation of (often inefficient) paths which cannot be easily abandoned. As newer theoretical developments, path breaking and path creation challenge the assumptions of path dependence and stress the possibilities of shaping the future.

This paper portrays path theories and their assumptions, concepts and implications for futures studies. Path dependence theory deals with critical events in combination with self-reinforcing processes that affect or even effect subsequent developments and lead to a stable state (lock-in). With path breaking, ways are discussed to unlock paths. Finally, path creation denotes attempts to shape a path according to the actor's or actors' will. In such, path theories reflect different ontological positions on drivers and restraints of change and persistence.

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The "planned path emergence" view suggested in this paper is based on the idea of restrictive indeterminism which stems from voluntarism and includes restrictions (instead of determinism), as well as randomness as interfering factors. Here, actors define an ideal path as their goal, choose strategies to shape it and act accordingly. However, they have to cope with the disturbance of this ideal path, i.e. the possibilities of change are restricted by gridlocked, but not inalterable structures which were set in the past and lead to inertia. Furthermore, their plans can both be stimulated and torpedoed by random events.

In his seminal work, Amara (1981) made the frequently cited distinction between *possible*, *probable*, and *preferable* futures. One might add *preventable* futures such as wildcards (Mendonça et al., 2004; Rockfellow, 1994) to indicate that futures studies can also fulfill an early-warning function. With this differentiation it became obvious that the futures field can be divided into a positive (possible and probable futures) and normative (preferable and preventable futures) sphere (McHale, 1978; Niiniluoto, 2001). Against this backdrop, the idea of *planned path emergence* argues that both the future "as will be" and the future "as should be" cannot be separated dichotomously, but rather should be seen as the endpoints within a continuum. Path theories can contribute to extend the theoretical language for this purpose.

The main ideas of (restricting) historicity (Heilbroner, 1960; Galtung & Inayatullah, 1997; Inayatullah, 1999; Kaivo-oja et al., 2004; Rescher, 1998; Wagar, 1993) and human-made change (de Jouvenel, 1964; de Jouvenel, 2000; Flechtheim, 1980; McHale, 1978; Niiniluoto, 2001) are certainly well established in futures studies. However, path theories can help to shed new light on these ideas.

In general, it can be considered to be useful to examine an object of study from different angles. This follows the ideas of *perspectivism* suggested by authors such as Sismondo (1996), Giere (2006), and Brante (2010). According to this, all descriptions and explanations are *partial* perspectives on reality which is too complex to be captured holistically. This argument is reminiscent to the poem "The blind men and the elephant" by John Godfrey Saxe in which an elephant is described as a wall, snake, spear, tree, fan, or rope – depending upon which part they touch. In this regard, path theories can provide special lenses through which future genesis can be seen in a certain perspective.

In particular, the explanation of both persistence and change is highly dependent on specific circumstances. Futures studies can benefit from middle-range theories that focus on special, but common cases. In this respect, path dependence theory can be applied to the case that involves critical incidents as triggers and self-reinforcing processes as causes that lead to a lock-in. Thus, path dependence must not be confused with other concepts of historicity such as inertia, habitual routines, learning effects, etc. Building on this, path breaking can be used to explain liberating processes starting from a path dependent locked-in situation. The ideas of path creation can be considered for practically shaping the future based on path dependence logic. Despite this specificity in circumstances, path theories work in many domains such as technology, society, and organizations.

Furthermore, path dependence on the one hand and path breaking/creation on the other hand represent two opposing views on how development occurs. The contradic-

tions between these theories elucidate the crucial points that have to be clarified theoretically from a futures point of view.

Finally, the ideal-typical division into four stages suggested by path theories potentially resolves this contradiction as it provides a reasonable time-oriented explanation for the coexistence of persistence and change, of determinism, chance, and voluntarism, and of predictability and non-predictability. In other words, these extremes are not necessarily incommensurable as they may occur successively.

Path Dependence Theory and Futures Studies

Path dependence theory argues that in combination with self-reinforcing processes, events affect subsequent developments and lead to a stable state: "A path dependent sequence of [...] changes is one of which important influences upon the eventual outcome can be exerted to temporally remote events" (David, 1985, p.332). It explains *persistence* rather than *change* (Djelic & Quack, 2007), and it shows *that* paths persist rather than *why* they do (Stack & Gartland, 2003).

Path dependence theory can be applied to a variety of domains. It was first developed to explain the persistence of inefficient *technologies*, which clash with the idea that the "invisible hand" of the market will always ensure that the ex-ante optimal solution will find its place. The most cited example of a path dependent technology is the QWERTY keyboard (David, 1985). In earlier typewriter keyboard layouts, the letters were arranged in the order most often used. This, however, led to the typebars becoming entangled when typing fast. The "solution" was to spread out the most frequently used letters so that the typing speed could be drastically reduced. Today, we have been writing with non-mechanic, electronic devices for a long time now so the entanglement of typebars should no longer pose a problem. The QWERTY layout, however, is still in use – despite the fact that there are many better layouts available such as the Dvorak, NEO, RISTOME or Colemak layouts (Tiberius, 2006, 2010).

The concept of path dependence was later transferred to the social sciences to explain the change and persistence of social *institutions* (e.g. family, government, etc.) and *organizations*.⁶ Interestingly, "[i]nstitutions generally turn out to be considerably less 'plastic' than is technology and the range of diversity in innovations achieved by recombinations of existing elements is observed to be much broader in the case of the latter." (David, 1994, S. 218)

A *weak* and a *strong* understanding of path dependence can be distinguished in the literature (Djelic & Quack, 2007; Sydow et al., 2009).⁷ In its *weak* sense, path dependence only indicates the imprinting effects of the past on the present and future or, briefly put, "history matters." This version can mainly be found in history itself. This perspective has two disadvantages, however. First of all, it can be considered a profane idea which can hardly deliver any theoretically valuable insights. Second, it is difficult to distinguish (weak) path dependence from other phenomena that argue in a similar manner and include lock-in situations due to history such as imprinting, escalating commitment, sunk costs, structural inertia, reactive sequences and institutionalizing (Schreyögg et al. 2003; Sydow et al., 2009 and the references mentioned there).

In its *strong* sense, which is taken in this paper, path dependence is conceptualized in a more sophisticated form as found in economics and political science. Most of the path dependence literature is based on case studies which are supposed to show how path dependent situations arise. For example, studies on lock-in effects concerning broadband connections (Bach, 2009), newspapers (Koch, 2008), nuclear power reactors (Cowan, 1990), the sugar industry (Krueger, 1996) and the tire industry (Rockoff, 1994) can be found.⁸ However, there are hardly any distinct *models* of path dependence. One pleasant exception can be found in the works of Schreyögg et al. (2003) and Sydow et al. (2009) who suggest breaking a path dependent process down into three phases as described in following:

Phase I (Preformation Phase) denotes the situation before the establishment of a path. From a futures point of view, the future is wide open in this phase and actors have a broad range of possible options to choose from. *Initial conditions*, in Vergne & Durand's (2010) view, therefore have to be very weak, otherwise there would already be some restriction. Sydow et al. (2009), however, correctly suggest that even during this phase, actions are already embedded in structures established in the past. It would be unrealistic to think of a situation that has no historic preconditions.

Phase II (Formation Phase) marks the beginning of the establishment of a path by a (small)⁹ *historic event* (Arthur, 1988 & 1994) or *critical juncture*.¹⁰ This incident can be an intentional and purposeful decision, but according to David (1985, p.4), historic events may also include "happenings dominated by chance elements rather than systematic forces."

What follows (and can therefore even be conceptualized as a separate phase) is the appearance of a *self-reinforcing process*. The basic idea behind self-reinforcing mechanisms is *recursive, positive feedback* or *increasing returns logic* (Arthur, 1988, 1994, & 1996). Many suggestions for self-reinforcing mechanisms can be found in the academic literature (Garud & Karnøe, 2001; Garud et al., 2010) such as adaptive expectations (Arthur, 1989), complementary effects (Sydow et al., 2009), coordination deficiencies (Arthur, 1988; Schelling, 1978), free-riding (Olson, 1965), large fixed costs/sunk costs (Arthur, 1988, 1989), learning effects (Arthur, 1988), network externality effects (Katz & Shapiro, 1995) and systemic diachronies (Senge, 1990).

Phase III (Lock-In Phase) can be seen as path dependence in a narrower sense. The further progress in time is considered *deterministic* (Mahoney, 2000).¹¹ The actors have no remaining alternatives and have to reproduce the set path with no way of escaping. The lock-in situation is often identified as inefficient (Vergne & Durand, 2010), i.e. even if there are better options, they cannot be chosen.¹² The lock-in is supposed to be ongoing unless an exogenous shock disturbs the system (Arthur, 1994; Djelic & Quack, 2007; Vergne & Durand, 2010).

This model helps us understand one of the most important ideas concerning path dependence, *nonergodicity*, which means that initially, more than one outcome is possible while later on, the outcome that finally comes into place depends on the historical development of the path. Then the actors who are caught in the path are literally "unable to shake free of their history" (David, 2001, p.19).

In Vergne & Durand's (2010) interpretation of path dependence, *contingency* plays an important role. They define it as being "unpredictable, non-purposive, and some-

what random" (p.741). Every assumption of path dependence theory has actually been criticized in the literature. Here we should focus on the critique that leads from path dependence to the concepts of path breaking and path creation in particular (Garud & Karøe, 2001; Garud et al., 2010). To begin with, the view of *initial conditions* is contradictory. There is not necessarily a distinguishable starting point for a path. Instead, *actors negotiate* them deliberately which means they are actually actor-made.

Second, path processes do not have to be *contingent* as suggested by Vergne & Durand (2010, p.741), who define them as "unpredictable, non-purposive, and somewhat random." The term *emergence* is probably more useful, as it indicates that actions of multiple actors interfere in a form which provokes outcomes planned by neither of them. The actors are, then, embedded in the contexts that emerged for future actions. For *self-reinforcing mechanisms*, the path creation view, again, suggests another, more *active* interpretation. Here, these processes are not deterministic, but "actors may engage in a variety of purposive actions to initiate and to endogenously sustain a bandwagon instead of waiting for exogenous reinforcing mechanisms to kick in" (Garud et al., 2010, p.765).

Finally, the idea that paths have to last forever can be criticized. Paths can indeed be interpreted as provisional stabilizations that can be changed, which in turn leads to path breaking. Path dependence has different implications for futures studies according to the phases defined in the process model of Schreyögg et al. (2003) and Sydow et al. (2009).

In *phase I*, the future outcome cannot yet be predicted because many alternative paths are still *possible*. In *phase II*, after the occurrence of the "historic event," *probable* future outcomes can be identified. Once the increasing return process shows a trend, a variety of alternative outcomes can even be reduced to the *one most probable* path. When the path is set in *phase III*, it is, *prima facie*, easy to predict the further development: when a certain technology, institution, etc. persists over time, i.e. when it no longer changes, it will more or less stay the same in the future.

With this in mind, one main *advantage* of path dependence theory is that it suggests that the plain binary mode of thinking of either *certainty and predictability* or *uncertainty and unpredictability* is too limiting. There are different levels (cf. Courtney et al., 1997). Furthermore, path dependence theory demonstrates that the level of certainty might change over time, suggesting that certainty increases over time. All this can be seen as a theoretical enrichment in the conceptualization of future change.

Some *critical issues* have to be pointed out, however. As pointed out earlier, not all processes are path dependent. As shown above, path dependence can be defined in a broader and a narrower sense. The broader perspective can hardly qualify as a theory. If the narrower interpretation of path dependence is adopted instead, only *very few* processes can be regarded as path dependent. The consequence, thus, is that path dependence theory can help explain future developments only in specific cases.

It is not helpful to limit the development of a path to a single historic event in phase II. In futures studies, this correlates with the concept of *wildcards* (Rockfellow, 1994; Mendonça et al., 2004) such as the oil crisis in the 1970s or 9/11. Rather gradual succession and a combination of a series of incremental changes can also establish a path (Djelic & Quack, 2007).

The lock-in in phase III denotes a deterministic view of future development. However, "[p]ath dependence does not preach historical determinism, where the totality of the present is derived from the totality of the past." (Håkansson & Lundren, 1997, p.123)¹³ Path dependent trajectories may tend to persist, but they are not set in stone. When a path is broken, there is a *discontinuity* that makes correct prediction impossible. This in turn leads directly to path breaking.

Furthermore, the idea of *prediction* based on a lock-in is quite *profane* and *unpretentious*. As mentioned above, path dependent processes more or less continue the way they have. The idea of the extrapolation of developments from the past into the future must be regarded as low-end, rather unprofessional futures studies; it does not correspond with the topical paradigm of multiple, alternate futures. Or in other words, the scientific objective of *exploring* possible or probable *futures* cannot be achieved in phase III.

In summary, the logic of path dependence implies an *exogenous* perspective. The actors have to *position* themselves in an uncontrollable environment. There are two ways to cope with such a situation (Wiltbank et al., 2006): either the actors have to make plans based on predictions, which, according to path dependence, can only work in phase III. Or they can try to quickly and flexibly *adapt* to changed circumstances. In view of path dependence, this would only be necessary in phases I and II. In phase III, as the situation is locked in, there is no longer any need for adaptation to new situations.

Like futures studies or management studies, applied sciences which deal with designing and controlling systems cannot content themselves with taking notice of a path dependent situation. Instead, they have to discuss how to actively handle paths. This leads to path breaking and path creation: "Given the assumption that change is path dependent, what are the possibilities of escaping the path set by the past: of escaping history?" (Håkansson & Lundren 1997, p.125) What are the possibilities of breaking history and making the future?

Path Breaking¹⁴ and Futures Studies

Path breaking can be defined as the "effective restoration of a choice situation – the insertion of at least one [superior] alternative course of action" (Sydow et al., 2009, p.702). Breaking path dependent trajectories is only sparsely discussed in the literature. This might be due to the fact that path breaking is actually contrary to the logic of path dependence: "If we define path dependence as a situation in which individual actors or organizations have lost their power to choose among alternatives, then the assumption that the same actors can unlock the path is obviously inconsistent." (Sydow et al., 2009, p.702)

Schreyögg et al. (2003) add a *fourth* phase to their path model which they call "*de-locking*." But how exactly can paths be broken? Path dependence theory mainly argues that only exogenous shocks can dissolve a path. However, from an agency point of view, the question is why actors have to wait for an accidental shock to happen. It would be more convincing if this very shock is deliberately caused by actors. Djelic & Quack (2007) also argue that not only single ruptures can stop paths, but

gradual succession and the combination of a series of incremental changes can also lead to a new path.

As Sydow et al. (2009) has made clear, it is obvious that unlocking a path requires actions exterior to the path itself. These actions have to *destroy* the *self-reinforcing mechanism* of the path dependent process which, at least in part, has to be reversible: "decreasing returns may lead to path transformation or facilitate the creation of a new path." (Djelic & Quack, 2007, p.163) From a systemic view, counter paradoxes have to override the original paradoxes that caused the pathological dynamics (Schreyögg et al., 2003). In detail, the authors suggest that for organizational settings, the actors captured in the path have to switch from the operational to the observational mode, i.e. they have to reflect their situation and begin a discourse which should also include emotional appeals.

How does path breaking relate to futures studies? When breaking a path can be traced back to an accidental incident – which is the typical logic of path dependence – then, again, this confronts futurists with the problem of the unpredictability of this very incident. Once the path has been broken, there is no longer a trend from the past that can be extrapolated. Neither the path-breaking event nor the new path can be foreseen. This, however, is compatible with the mainly widespread idea that futures cannot be predicted, only explored.

When a path is broken due to human will and action, the aspect of agency is added to path concepts. With this, predicting "the" future is just as arduous, because human will can hardly be predicted, if at all: "In [circumstances]¹⁵ characterized by Knightian uncertainty,¹⁶ prediction and control are not just empirically mismatched; they are conceptually at odds. Prediction can never be adequate for the purpose of control, even in principle, because of the role of human creative action in actually producing a non-existent, not just a hard-to-predict, future." With the inclusion of agency, path breaking even goes beyond the logic of exploratory futures studies: it can be seen as a break with history and, therefore, as opening up new future *possibilities*. The very possibility of breaking paths shows that the future is not deterministic, but can be changed.

In this conceptualization, actors do not have to position themselves in the changing and uncontrollable environment, but they can *construct* it (Wiltbank et al., 2006). The attempt to make a prediction is substituted by control, which means endogenizing the environment.

Path Creation¹⁷ and Futures Studies

While path dependence concentrates on the development of an involuntary path, path creation reflects the intentional setting of a deliberately chosen path. The path creation perspective can be seen as a critical answer to the passive observer's view of path dependence theory, which "rob[s] actors of any agency, as they find themselves pushed and pulled from one state to another" (Garud et al., 2010, p.768; cf. Garud & Karnoe, 2001; Stack & Gartland, 2003). As in the path dependence literature, path creation research is often conducted in case studies. Examples include path creation processes in biotechnology (Rao & Singh, 2001), the minivan market (Porac et al.,

2001) or the formation of Silicon Valley (Kenney & von Burg, 2001), as well as Garud & Karnøe's (2001) portrayal of the 3M case of Post-It® Notes.

To create a path according to their path model, Schreyögg et al. (2003) argue that a critical juncture and self-reinforcing mechanism have to be set. So a critical mass must be achieved to reduce the room for maneuver ("generating momentum"). The actual "path shaping" takes place in *phase II*. As in the original model, the lock-in marks the virtual path dependence in *phase III*.

How, exactly, can path creation succeed? For Garud & Karnøe (2001), the main requirement is *mindfulness*, which "implies the ability to disembed from existing structures defining relevance and also an ability to mobilize a collective despite resistance and inertia that path creation efforts will likely encounter" (p.2). For them, disembedding is mainly a cognitive¹⁸ task which involves deframing, discrediting and unlearning. Interestingly, while Sydow et al. (2009) suggest that for path breaking, actions *exterior* to the path itself are necessary, Garud & Karnøe (2001) actually want actors to *endogenize* objects, relevance structures and time so that they can ultimately disembed from existing paths.

In regard to futures studies, path creation directly corresponds with the idea that the future is not deterministically defined, but can be and has to be shaped. There is an elementary resemblance in the logic of both futures practice and path creation: both can be understood as a "process where practitioners work backwards to fulfill a projected future state" (Garud & Karnøe, 2001, p.3). So for those futurists who do not commit to the *explorative* objective of the field, path creation is a most appreciated view for their *normative* access to futures studies (de Jouvenel, 1964; de Jouvenel, 2000; Flechtheim, 1980; McHale, 1978; Niiniluoto, 2001). Again, however, there are some limitations. Path creation does not only stress the creation of new things, but definitely includes the idea of a *path*. As previously defined, a path is often inefficient, yet even if it is not, this means that a certain route has to be taken in the future. This in turn temporarily reduces alternate future possibilities, which, again, has two implications: if a new path is created, it is easier to foresee coming developments, but on the other hand, the range of alternative, possibly better paths is minimized.

What all three path theories have in common is their insight that *efficiency* should not be considered the keystone in the explanation of future genesis. Path dependence must be regarded as a market failure. And actors who break or create a path do not necessarily have the most efficient solution in mind (Garud & Karnøe, 2001). From the perspective of path theories at least, they can offer no support of the old idea that history always leads to a better situation (e.g. Hegel's (1807) *Weltgeist*).

"Planned Path Emergence" as a Realistic Middle Course

The confrontation of path dependence on the one hand and path breaking – and especially path creation – on the other hand has shown that path-related theories differ in their *exogenous*¹⁹ or *endogenous* perspective, i.e. the driving forces that shape paths are either *anonymous* (e.g. markets) or concrete *actors* such as entrepreneurs (Garud & Karnøe, 2001; Garud et al., 2010) or other *elites*. People are either *observers/victims* or *actors/shapers*. This can be referred to as an *outsider's* or *insider's ontology*

(Garud & Karnøe, 2001; Garud et al., 2010). Johnson (2001) speaks of a *structure-based* or *agency-based theory*. Accordingly, both views can be distinguished by their positioning in time: path dependence adopts a *historic* perspective,²⁰ whereas path breaking and path creation take a *real time* position (Garud & Karnøe, 2001; Garud et al., 2010). This corresponds with a passive/active distinction: "The past is over and done with. It is a closed book. Although we can change our ideas about the past and can rewrite history, the past itself does not change. The only thing we can influence by our actions is the future." (Bell & Olick, 1989, p.126)

This is reminiscent of the *locus of control* concept (Rotter, 1966), which postulates that behavior significantly depends on the either generalized *external* or *internal* control beliefs. People either ascribe their capability to control things and developments to external causes (e.g. other people, chances, or fate) or to themselves. This is based on the expectancy-value theory of achievement motivation (e.g. Wigfield & Eccles, 2000), which states that the probability a person will execute an operation increases when he or she regards a specific outcome as important and believes that the operation will lead to that outcome. Path dependence conceptualizes people as *passive observers*, whereas path breaking and path creation view them as *active shapers*.

Both perspectives can be considered extreme positions on a *continuum* that ranges from being a passive victim to an active shaper. As is often the case, a realistic position can be assumed to lie somewhere in between the two extremes. On the one hand, a completely fatalistic view would make any endeavor to create innovations obsolete because paths, from this view, are deterministically set and no action whatsoever could change them. On the other hand, it is simply impossible for every actor to shape the future according to his or her very own will, as actors' ends and means interfere and there are historical restrictions, as well as accidents, which cannot be foreseen. Djelic & Quack (2007) point out that the complexity of path generation increases with the complexity of the system. In such, new paths can, for example, be created more easily in organizations in comparison to national or even transnational institutional systems. An actor with a fully voluntaristic view can insofar be considered as an "optimistic martyr" (Dosi & Lovallo, 1997) who overestimates his or her possibilities of creating the exact future he or she strives for. "[N]either [...] the assumption of determinacy nor [...] that of completely unrestricted choice" (Sydow et al., 2009, p.693) are realistic. "Given the possibility of human agency, no path is ever entirely dependent; and given the cumulative nature of [processes]²¹, no path is ever really new. Thus, the past is not completely fixed, and the future is not completely open." (Hirsch & Gillespie, 2001, p.87)

Garud & Karnøe (2001) and Garud et al. (2010) point out that their view of path creation is also a midway position and should not be misunderstood as being purely action-oriented and neglecting emergent factors or developments: "Path creation does not mean [actors]²² can exercise unbound strategic choice. Rather, entrepreneurs are embedded in structures that they jointly created." (Garud & Karnøe, 2001, p.2) However, the very term "path creation" mainly stresses the voluntaristic aspect and hardly reflects on restrictive, accidental issues. Johnson (2001) suggests the term "path contingency" which seems to over-emphasize the role of chance.

What can be considered the *drivers* and *restraints* of *future genesis* and what roles do they play? Path theories discuss three items : *choice*, (historic and current) *restrictions*, and *chance*. The *voluntaristic* view of choice can be found in path breaking and path creation. Path dependence is based on a *deterministic* view in which historical restrictions control the further development. In phase II of the path process model, the view of *randomness* (chance) also plays a role when it comes to the critical juncture or its emergent outcome. In regard to randomness, however, it is important to distinguish between absolute and relative randomness. The former means that an incident occurs for no necessary reason (only sufficient condition). Relative randomness, in contrast, defines an event as unpredictable from the actors' point of view only. From this perspective, "[h]istoric small events" are defined by Arthur (1988, p.118) as "those events or conditions that are outside the ex-ante knowledge of the observer – beyond the resolving power of his 'model' or abstraction of the situation."

In a world of human agency, choice can be considered the dominant view: actors set their goals, choose strategies to reach them and act accordingly. However, they have to take into account and accept the disturbance of their ideal path. Their plans can be stimulated or torpedoed by chance events, and the possibilities of change are restricted by gridlocked structures that were set in the past and led to a certain inertia: "[W]e are not slaves of the past, but we are its children." (Håkansson & Lundren 1997, p.132) However, these restraints must not be seen as a given since they can be changed themselves. One view that includes all three ontological perspectives on future genesis could be called *restrictive indeterminism* (Tiberius, 2008; von der Oelsnitz & Tiberius, 2009), or – in the context of path theories – "*planned path emergence*."

Restrictive indeterminism can be described as an ontological view that favors voluntarism, yet also accepts restraints. It accepts chance events but rejects determinism, substituting it for restrictions. The rejection of determinism is based on the conviction that there is no ex ante schedule for the course of events which has a determining effect on actions of human beings. Instead, the existence of historically formed structures is accepted, which channels the corridor of possible actions. Within the comprehensive set of multiple options for action, only one subset can really be executed.

Planned path emergence suggests that a path is planned by one or a number of actors (depending on the complexity of the objective) who work as path shapers. When shaping the path though, they have to cope with both (relatively random) chance events and restrictions that were set in the past.

Similarly, the idea of "*planned evolution*" suggested by Kirsch et al. (2009) and Kirsch et al. (2010) is based on the works of Etzioni (1968) and Resolve (1967) who build on the assumption that the development of complex socio-technological systems requires a combination of both an efficient overall control and incremental step-by-step approach that follows the actual situation (Seidl & Werle, 2011). Here, instead, it is suggested the term "emergence" is used rather than "evolution," as the latter leaves the identification of drivers of change completely open (or may ascribe them to anonymous powers), whereas "emergence" points out that unexpected, and therefore contingent, outcomes may occur due to the systemic interactions of single action strands. Emergent outcomes can, for instance, be reduced to bounded rationality

(Simon, 1959) and political games between actors who have divergent interests and objectives (in general: See Burns, 1961; Crozier & Friedberg, 1977 for politics in general and Hirsch & Gillespie, 2001; Johnson, 2001 for path theories in particular).

Conclusion

In this paper, path theories were discussed to test their suitability for offering an explanation of future genesis. A theory of change basically has to comprise the *drivers* and *restraints* of change and persistence, as well as a model which explains the very *process* of development.

From the investigation of the line of argumentation of path theories, it became clear that they are based on different ontological assumptions about the *drivers* and *restraints* of change and persistence. Some argue its anonymous powers that drive the process, others argue its actors who attempt to gain their objectives. It also became obvious that the *process* of development is conceptualized very sophisticatedly (possibly even too specifically) in path dependence theory, whereas both path breaking and path creation still call for theoretical development when it comes to the actual process of breaking or shaping a path.

With *planned path emergence*, a middle course was suggested. Congruent to the prevailing view in futures literature that the idea of shaping the future should dominate over the conception of a predetermined future that can be attempted to be predicted, restrictive indeterminism in general and planned path emergence in particular focus on the voluntaristic perspective (choice), yet simultaneously accept restrictions and random events.

This paper does not, however claim path theories to be the best theories for future genesis. The discussion carried out here is exemplary and should therefore be seen as an explorative approach that should lead to greater attention to the *explanatory objective* of futures studies. As the "competition" between theories of (historical) change can enhance the understanding of past developments, competing theories of future genesis will help us better understand how the future unfolds, and how its development can be shaped for the good of society.

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Notes

1. Vergne & Durand (2010) make another distinction between the macro, meso, and micro levels. For them, the macro level covers institutions, the meso level governance or technology outcomes, and the micro level organizational rigidity.

2. Abbreviation for international marketing and purchasing (of industrial goods).
3. In organizational science and (strategic) management, path dependence became one of the most discussed theories. Between 2003 and 2007, 10.5 percent of all articles published in the seven leading scholarly journals dealt with path dependence theory (Vergne & Durand, 2010).
4. Hirsch & Gillespie (2001, pp.74 et seqq.) examine the "history matters" argument in different scientific disciplines.
5. Futurists, however, are seldom historians. In the Futures Research Directory, Wagar (1993, p.450) found only ten historians among 1,200 futurists. Their research was mainly concentrated on historic views of the future which, in the meantime, have actually become history.
6. Not only can entire organizations be path dependent, but also partial aspects like strategies (Holtmann, 2008 & Lüttel, 2009).
7. The weak vs. strong interpretation of path dependence must not be mistaken for the weak vs. strong form (first, second and third degree) of path dependence brought into discussion by Liebowitz & Margolis (1990 & 1995). This definition refers to the possibility of making (weak) or not making (strong) changes to shake free of an inefficient solution.
8. Further current examples can be found in Schreyögg & Sydow (Eds., 2010).
9. Paradoxically, historic events that lead to path dependency are often described as "small." This might be influenced by chaos theory: "Small, seemingly insignificant events in the past might flip the coin over and alter the direction of change." (Håkansson & Lundgren, 1997, S. 122). However, there is no necessity of reducing the beginning of path dependence to small events. "Big" events, certainly, will even be more effective (see also Hirsch & Gillespie, 2001, p. 72; Sydow et al., 2009, p. 693).
10. Sydow et al. (2009) conceptually put the critical juncture at the end of phase I, whereas it could be seen as more convincing to place it at the beginning of phase II, which actually marks the start of the path formation. This, however, is not worth arguing over since, theoretically speaking, there is no time frame between these phases.
11. Sydow et al. (2009) point out that, at least in organizational settings, full determinacy is no appropriate assumption. They prefer to see a path dependent process "as a *predominant* social influence, leaving some scope for variation" (p.695).
12. Sydow et al. (2009), correctly suggest to only assume potential inefficiency, as inefficiency cannot be seen as a sine qua non for path dependence (cf. Hirsch & Gillespie, 2001).
13. As cited above, the notion of determinacy is seen quite differently.
14. Also: "path destruction" (Hirsch & Gillespie, 2001, p.84) and "path dissolution" (Sydow et al., 2009, p. 701). Path breaking can also be seen as an intermediate process between path dependence and path creation, as it is usually necessary to break an old path before a new one can be established. Thus, this process can also be called "path transition" (Hirsch & Gillespie, 2001, p. 84; Djelic & Quack, 2007, p. 162).
15. "Environments" in the original version.
16. Knightian uncertainty denotes a situation when alternative outcomes are possible, but no individual probabilities of their occurrence can be specified (Knight, 1921).
17. Also: "path generation" (Djelic & Quack, 2007).

18. This was also evident in a *social constructionist* view (Berger & Luckmann, 1967), which suggests that reality and truth per se cannot be perceived, but are negotiated socially. This leads to the idea that even technological innovations must be interpreted as products of social construction (e.g. Garud & Rappa, 1994; Pinch, 2001; Porac et al., 2001).
19. The exogenous ontology mentioned here is similar, but must not be mistaken for the "exogenous perspective" argued by Sydow et al. (2009, p.702), which means that only external powers can break paths.
20. "Events that set paths in motion can only be known post-hoc. Consequently, the role of agency can be viewed as one of entrepreneurs watching the rearview mirror and driving forward." (Garud & Kamøe, 2001, p.7)
21. "R&D" in the original version.
22. "Entrepreneurs" in the original version.

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