DYNAMIC TIME AND ORIGINATIVE CHOICE: SHACKLE REVISITED

By

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Abstract

G.L.S. Shackle developed a thorough analysis of choice based on a full-blooded version of dynamic time. In the present paper, definitions of static and dynamic time is provided and Shackle's use of dynamic time is examined. Shackle's use of dynamic time in the social sciences is exceptional because he very carefully provided the justification necessary to uphold such a time concept. It is further argued that Shackle needed dynamic time to account for originative choice. Finally, some implications of Shackle's analysis are considered.

Keywords: dynamic time, originative choice, imagination, Shackle.

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Cause and effect are indispensable to my argument, but only subject to the exemption of thought itself from the entire governance by influences outside itself. Let the statistician interpret me as meaning that thought can be random, let the poet understand me as saying thought can be inspired. (Shackle, 1976; p.22).

Introduction

For students of choice, there is a division between acting and the psychology behind acting. Most economists analyse actual observable acts and let psychologists inquire into the depths of the emotion and psychology associated with choice. Following a period of rich interchange between cognitive psychology and economics, a distaste for psychology became widespread among economists in the first decades of the twentieth century (Loewenstein & Elster, 1992). Among the casualities were the economic treatment of time and change associated with intertemporal choice (Loewenstein, 1992) and institutions (Hodgson, 1999). Perhaps it is no coincidence that both issues reappeared in economics in the 1980s along with a renewed interest in psychology (Rabin, 1998), time (Loewenstein & Elster, 1992) and evolution (Hodgson, 1999).[ii] Much of this interest is evidently sparked by the increasing importance attached to dynamics and complexity in observed empirical phenomena (Arthur, 1994; Arthur et al., 1997; Axelrod, 1997; Day, 1984, 1993; Dosi, 1997; Nelson, 1995) but a more

[i] Comments from Søren Askegaard, Mie Augier, Nicolai J. Foss, Eva Grady, and Geoffrey M. Hodgson are appreciated. Also comments from Roger Koppl and the participants at the session on time in economics at the Eastern Economic Association meetings, March 12-14, 1999, Boston are acknowledged. Any remaining errors were produced without help.

[ii] Hodgson (1993, 1999) presents an elaborate history of the economics of evolution, Loewenstein (1992) provides a good review of the history of intertemporal choice in economics and O'Driscoll & Rizzo (1985) presents a splendid history of the treatment of time in economics.

fundamental concern is also apparent. This concern is associated with the limits of the discounted utility model (Loewenstein & Elster, 1992), the dominant theory of intertemporal choice, and more generally the foundations upon which it rest (Hodgson, 1999).

The present paper is concerned with descriptive theory of choice in time. Its point of departure is the economist G.L.S. Shackle, one of the few heretics who endeavoured to give both time and originative choice centre stage already in the 1950s. Why, then, should we bother about a descriptive theory of originative choice in time and why should we bother with Shackle?

Apart from sharing a general dissatisfaction with the discounted utility model expressed by leading economists, I think it is important to understand the underlying reasons for its failures (Hodgson, 1988, 1993, 1999; Lawson, 1997). Among those reasons, the perhaps most fundamental one is to understand how alternative concepts of time constrain theorising. If we want to encompass originative or entrepreneurial choice in our theorising, we need to be clear about how novelty enters the analytical universe. As Lawson (1997) has argued, it is neccessary to embrace the idea of an open universe in order to do so. To allow for novelty or creativity in the same agent over time, we further need to embrace the idea of dynamic time. This is so, since agents in static time must either be inconsistent or altogether different entities before and after a creative spark changes matters. Here, Shackle is an excellent point of departure since he is one of the few economists who managed to make consistent use of dynamic time.

Moreover, the following exposition is based on the presumption that it is interesting to understand economic phenomena from the perspective of the individual decision maker. In the aggregate, decision making biases may even out, however, they have important consequences for the individual decision maker and the organisations depending on her

choice. Sometimes creativity in a few decision makers leads to unexpected and unprecedented success, and sometimes it leads to human error with disastrous consequences (Reason, 1990). Creativity is viewed as a cause for deviation from what is predetermined. Getting a better grasp of the dynamics underlying choice may help us understand how creativity works as a source of variation in economic systems.

The perspective in the present work is the situation of the individual decision maker, and our interest is the room for creativity left by the passing of time. The larger issue is the need to understand the deviation from regularities that allow prediction. That is, to understand *what happens when free will kicks in,* as Vonnegut (1997) puts it in a recent novel in which its characters relive a period of ten years without the powers to change a iota of what happened the first time around[iii].

The starting point for the analysis is time itself. At the systems level, a static time concept is needed to provide the necessary basis for analytical consistency. At the individual level, commonly observed inconsistencies in time preferences (Thaler, 1981; Benzion et al., 1989) indicate that a dynamic time concept may come in handy. For example, it is likely that some individuals may prefer one apple today over two tomorrow and yet prefer two apples over one if the choice was delayed a year (Thaler, 1981).

G.L.S. Shackle developed a thorough analysis of choice based on a full-blooded version of dynamic time. It is not unusual, for example in Austrian Economics, to find inconsistent uses of dynamic time that ignores some of the necessary requirements[iv]. Therefore, the term "full-blooded" is used to characterise those who consistently employ dynamic time heeding its accompanying presumptions. It should be noted that the issue is a consistent use of either

[iii] No quip to economics is presumable intended by Vonnegut (1997).

[iv] I avoid pointing at any particular work.

static or dynamic time. I am not arguing in favour of one over the other. As shown in the ensuing, Shackle's notion of dynamic time fulfills all the necessary formal philosophical requirements. In the social sciences, this is a rare exception which justifies a reexamination of Shackle's work. Thus, the present work can be seen as both an extension of recent work on time in economics (O'Driscoll & Rizzo,1985) and a complement to the approaches which, out of a dissatisfaction with the discounted utility model, aim to contrive a new basis for theorising on time and choice. To maintain focus, other aspects commonly associated with Shackle (such as nihilism) are evaded, however, see e.g. Augier (1998).

In the present paper, I first provide definitions of static and dynamic time. This difference, often ignored, is the source of much confusion. Then, I examine Shackle's use of dynamic time to devise a theory of choice that leaves room for creativity. Finally, some implications of Shackle's analysis are considered.

Time Concepts: Dynamic and Static

Shackle, in a number of works, uses the concept of dynamic time. Since the concept of dynamic time is not widely used in the social sciences, the ensuing sections provide a definition of sufficient detail to allow appreciation of Shackle's use of the term[v]. Two problems in the economists use of time concepts inspire a careful explication of their analytical premises. First, the definition of time used in main stream economics is implicit. Since more than one static time concept is conceivable and since more than one perspective on time is used in main stream theorizing, we need clarification. The same appeal must be made to those who use dynamic time concepts without further clarification. Second, some critics of main stream economics view static and dynamic concepts as dichotomies. Although static time cannot be used to define a dynamic time concept, the latter presupposes the former. To make a clear definition of dynamic time, the ordering, *before, contemporary with and after* must be assumed, i.e. dynamic time is necessarily irreversible. This ordering is provided by static terms.

--- Table 1 about here ---

Table 1 provides an overview of time concepts to be defined in the ensuing. I shall focus on: (1) static and dynamic time, (2) the relation between static and dynamic time, and (3) the relation between an all-encompassing superconcept of time, events and actualities *within* time. Since the interest is in decision making, the exposition is not limited to physical conceptions in time. Subordination to time is shared by cognitive and physical processes and our treatment of time shall, in principle, encompass both processes. Furthermore, it should be noted that the following overview of time concepts excludes developments that move beyond

[v] The following overview has benefitted from Lübcke's (1981) useful philosophical inquiry into the concept of time.

what may be termed vulgar time. Specifically, I shall not consider Martin Heidegger's (1977, 1989) analysis of time[vi].

Static Time

In the ensuing, the basis for the commonly used analogy between time and the line in space is described. The ensuing section describes the idea of dynamic time and the metaphores commonly used to convey this idea. Whereas static time and the line are similar in nature and thus analogous, the concepts used to capture dynamic time are more inspirational in nature, i.e. they are metaphores.

The analogy of static time is the line, a sequence of points in space. Time, by analogy, can be viewed as *a sequence of points, each denoting synchronous occurrences*. The geometrical line is divisible into pieces with spatial extension but each point has no extension. Likewise, time is divisible into spans that have extension. A time span is a subdivision of time that is extended over a certain stretch whereas time points have no extension. Processes (such as haggling) are time spans whereas occurrences (such as breaking off the haggling) are points in time. Points in time are limits between different time spans. Thus, certain occurrences mark the beginning and end of different time spans.

Furthermore, the sequence of points in time is *ordered by the criteria before and after*. Points in time can be ordered in a sequence and due to the criteria before and after, their relation is asymmetric and transitive: (1) when X comes before Y then the opposite relation does not hold, (2) when further Z comes before X, and X before Y, then Z also comes before Y.

[vi] Knudsen & Augier (1998) provide a comparison of time and choice in Heidegger, Schütz and Shackle.

The line is an ordered sequence of points in space. Time, by analogy, is an ordered sequence of time points denoting occurrences. One occurrence is before, synchronous with or after another occurrence. The same analogy holds for time spans even if they can be partly overlapping, i.e. a process. The sequence of time points is an unchangeable order because no time points can swap place.

Measurement of time takes the analogy between the line and time further. Both can be measured by allocation of a unique number so points in time with lower numbers come before points with higher numbers. Measurement of time allows quantification of the qualitative ranking of time points and thus introduces the necessary precondition for introduction of time as an object in social space.

Traditionally, we have used the sun to measure and date time. However, any recurrent process will do. Time can be measured by assigning numbers according to the location of the sun or as Lübcke (1981) asserts, we could, in principle, have a “munk clock” where the unit of measurement was the heart beats of Dalai Lama; a rather inconvenient standard due to its variance. As aforementioned, the measurement and dating of time provides the necessary precondition to introduce time as an object in social space. Introduction of objective time further leads to introduction of its twin, experience time or subjective time. A wedge between inner and outer time is introduced but as argued in the ensuing, it would be wrong to state a difference in objectivity between the two. Rather the difference is a matter of convenience in facilitation of social interaction.

We probably all experience how time spans of the same objective length can have different duration. Also, experience of duration changes with age, i.e. there is a tendency for time to fall shorter and shorter as aging proceeds. It should be noted, however, that the assignment of the sun’s revolution as the basis for measurement of time could be viewed as random.

Furthermore, although the sun's revolution is a real phenomenon, it does not follow that sun-time is more objective than experience time. It is simply a matter of convention and convenience. In both instances, we assign a number to time points. As we assign numbers to time points by reference to the sun's location, we assign moments to time points that have significance in our life. This can be referred to as outer and inner time respectively. However, it would be wrong to state that there is a difference in objectivity between the two. The difference lies in what is used as reference to measure time, a real and objective phenomenon or a subjective phenomenon. Clearly, the former is convenient because it greatly facilitates social interaction.

Measurement and dating of time in social space allows the assignment of occurrences to numbers. Furthermore, we can, in principle, identify an infinite number of occurrences between any two non-synchronous occurrences. Therefore, time, like a line in space, has continuity and compactness. Also, for every point in time we can identify another point that is before and after. Like the line in space, time is, in principle, infinite.

To sum up, static time uses the analogy of the line. Static time is a compact, continuous and infinite ordered sequence of points (occurrences) and the points serve as limits between different stretches of time (processes). The order is static, unchangeable, and time is quantified by reference to an arbitrary phenomenon, the sun's revolution. By establishing the analogy between time and the line in space, we have further assigned equal significance to each time point. The analogy between geometry and time can be used to give time direction. This introduces the arrow of time adding direction to static time; i.e. static time can either use the analogy of the line *or* the vector.

Dynamic Time

Change is the dictum of dynamic time. Heraclitus' analogy, that we cannot observe the same water in a river twice, raises the issue of change and identity. Therefore, we can use the river as a metaphor to denote the flow of time to capture the idea that time is in permanent flux.

Static time is a sequence of time points where occurrences are ordered by noting their location as before, synchronous or after other occurrences. It is an unchanging order where all time points have equal validity. The idea of change alters this conception of time. According to the analogy of time as a river, occurrences differ and the differences between occurrences introduce an order of *past, present and future*. The focal point of this analogy is the present. The future somehow is transformed to present occurrences that eventually disappear in the past. Dynamic time is an ever-changing order of occurrences where the past, the present and the future differ. This raises the issue of movement *between* past, present and future states of the world. Whereas the movement of a river is a movement in the substance water, we cannot use this analogy to introduce time as a substance. If we did, then we would be left with the task of devising a metaphorical container for time (as substance). As argued in the ensuing this cannot be justified.

Furthermore, the movement of water in a river can be described in space and time. There is no clear analogy that describes what sort of movement time is. Perhaps, a mental movement as indicated by the notion stream of consciousness? Unless we can devise a container in which such movement can take place this will not hold. It turns out that the idea of time as a container cannot be justified, even on a metaphorical level. The problem is what the metaphorical container would be contained in. By insisting on this question, a problem of infinite regress is introduced. Put differently, since dynamic time is all-encompassing the container metaphor is problematic due to its limits. As Lübcke (1981) notes, the *only* analogy

between time and a stream of water that can be justified is some sort of movement or change and, consequently, any other association should be denounced. This leaves us with dynamic time, as change *sui generis*, i.e. change *in* the occurrences and time points that cannot be described by reference to any substance.

There are two complementary perspectives of change. One is the change in the river as a man crosses it. The other is change in the man as he crosses many rivers. Accordingly, the contrasting analogy to time as a stream of occurrences experienced by an unchanged observer is the idea of time as a change in the observer. Chronos is the symbol that denotes change in everything that exists in time, i.e. time "eats" its own children. That something exists in time implies that it will necessarily disappear into the past and cease to exist. As Lübcke (1981) notes, even gods living forever cannot escape a radical interpretation of Chronos. Although they do not experience any form of decay, their actions, experiences, moods and so on will change. As the gods live on and on, they pass through one phase of existence after the other and the phases disappear into the past as they are realized.

Note that the two dynamic time concepts are complementary perspectives on the same time concept. In the first one, there is change in the river. An unchanging observer observes a stream of changing events. By contrast, the Chronos symbol denotes an unchanging present where events are changed as they pass from possibilities of the future to past realizations. In other words, we have two complementary accounts of an identical dynamic time concept.

In the above, I have noted that there are problems in defining a container of time. However, what if time itself was the container? Then it would be possible to distinguish between time and what exists and changes in time. Although this solution has some intuitive appeal, it cannot be upheld for several reasons (Lübcke, 1981). First, the container is a symbol that denotes space. To justify this contention, we would have to define what is outside space or

accept the flawed analogy of an all-encompassing container. Due to the aforementioned problem of infinite regress, the analogy cannot be uphold; however, by defining time as a container, we borrow this flawed analogy. Second, if time is viewed as a container, we need to provide an account of the flows that replenish its contents. If the container is all encompassing, it seems problematic since we need to define what the container is contained in. Third, we should be able to account for the eventuality of an empty container. In other words, it is necessary to justify a concept of empty time, a rather uncomfortable idea. At least for these reasons, time concepts that introduce a divide between time and its contents cannot be upheld. In conclusion, time can be justified as a stream of life (river metaphor) or the complementary alternative can be adopted where time is defined as a changing condition (Chronos) that makes relations in time possible. According to the latter definition, time opens the possibility for the temporal relations of static time (before, synchronous with and after).

Having defined two complementary concepts of dynamic time, we further need to establish the possibility of dynamic time as a structure of past, present and future. The difficulty lies in how to reconcile existence in three *different* times? In other words, how can the *same* occurrence be ascribed three different times? Lübcke (1981) shows that a reduction of dynamic time to static time will not do. Then what? The solution is to introduce a notion of direction in time, i.e. an absolute notion of direction. What we are looking for is irreversibility and there are two possibilities: (1) irreversibility as a property of existence in time, or, even better, (2) irreversibility as a property of time itself. The first possibility can, for example, be established by reference to decay of biological life. What about the second?

Inspired by Heidegger, Husserl and Kierkegaard, Lübcke (1981) suggests that *self-conscience* may be a solution. Through self-conscience I have a direct relation to the existence of occurrences in time. As I experience an event, a mental occurrence happens and its existence is given for my self-conscience. Through self-conscience I have direct access to mental

occurrences as they enter into present existence. Moreover, all the events that I determine as synchronous with my present mental occurrences must be present because they coexist at the same point in time. Therefore, self-conscience provides the time-invariant link between distinct moments in time necessary to uphold the idea of dynamic time. Accordingly, Lübcke (1981) concludes that self-conscience can be viewed as part of an all-encompassing time-consciousness. In principle, self-conscience is open to events in the past, present and future because it is part of an all-encompassing time-consciousness.

In sum, when time is defined as a possibility for existence and self-conscience as an openness towards existence, it is possible to devise an internally consistent dynamic concept of time as an ordered and ever changing structure of past, present and future. The above account provides some criteria for classification and judgement of internal consistency in Shackle's perspective on time.

Dynamic time and creativity in Shackle

It is commonly recognised in modern studies of human error that unconscious processes rely on a similarity and frequency gambling principle (Reason, 1990) which is the basis also of modern economic theories of choice. Whereas unconscious processes to some extent rely on distributions of frequencies, conscious choice adds novelty. According to Shackle (1954), choice would be deterministic if it were not so. Rejecting the idea that decision makers are statistical entities, Shackle (1949) develops an alternative to the theory of expected utility based on the principle of potential surprise. In subsequent work, a concern with the role of creativity led Shackle to consider the role of time from a subjective viewpoint.

Shackle's consideration of subjective time may be viewed as a development of Bergsonian

ideas on dynamic time (Knudsen and Augier, 1999; O'Driscoll & Rizzo,1985; Rizzo, 1994) that allows a break with determinism. A dynamic time concept implies a distinction between past, present and future experiences of some duration. As Shackle (1954) explains, the present moment is a brief span whose contents the mind somehow grasps as a whole. According to Shackle (1954), moments, or elements of time, can be described as an ordered sequence of more or less remote elements that have some duration. Provided moments are distinct and yet connected this is dynamic time. By asking whether it is meaningful to compare comparisons made at different dates, Shackle (1954) directly addresses the issue of distinct moments. The answer, according to Shackle (1954), is that there is no meaningful answer to the question. Moreover, Shackle (1954) explicitly uses the term dynamic time and explains that it is the locus of actual experience involving sensation as well as the locus of the acts of mind in themselves. It is an allencompassing time concept, completely in agreement with the philosophical concept of dynamic time defined in the present work.

Dynamic time, for Shackle, is the *constituting* structure of past, present and future subjective states. The term constitute is meant to convey the dynamic time concept used consistently throughout Shackle's work to describe how action and thought come into being, i.e. Shackle's use of dynamic time is ontological. To analyse the dynamics of subjective states associated with the formation of expectations in choice, Shackle introduces a supplementary time concept, *imaginary time*. This term is the epistemological twin of dynamic time. In the following, I shall return to the role played by imaginary time in Shackle's analysis of choice. Before this is done, it remains to be seen if Shackle also solves the thorny problem of linking the distinct moments of past, present and future in dynamic time.

Shackle repeatedly throughout his work on time asserts that in actual experience, two distinct moments cannot be compared in any sense at all. Strictly, since judgments and decisions are actual experiences, they cannot be said to be either consistentent or inconsistent with one

another (Shackle, 1954). No viewpoint in time can be common to two judgments or decisions since each judgment and decision is associated with a distinct moment. There is no doubt that Shackle abides by a dynamic time concept which insists that moments are distinct. But how are the distinct moments linked? As aforementioned, the solution to this paradox proposed by philosophers such as Bergson and Heidegger is self-conscience.

Shackle's interest in the concept of dynamic time is its implications for lifting the deterministic constraints on choice. Perhaps this is the reason that the philosophical matter of justifying a dynamic time concept is evaded in most of Shackle's works. The exception is Shackle (1958) where a very elegant solution to the paradox associated with dynamic time is provided. First, Shackle (1958) introduces the inside and the outside view of time. The inside view, the subjective time in which we think, is comprised of distinct moments. The outside view is the mathematician's objective time about which we think. Then, Shackle (1958) allows us to move between the inside and the outside view of time without losing awareness. By moving between the inside and outside view of time, we can realize the process by which objective events enter consciousness. Again, self-conscience is used to justify dynamic time, albeit in a manner that differs from the simultaneous consciousness of inside and outside time implied by Bergson. Having established that Shackle devised a thorough concept of dynamic time, we may ask, to what use is it put?

As explained in the ensuing, Shackle uses dynamic time to salvage choice from the causal constraints imposed by standard rational choice theory.

Choice: deteministic or creative

Now imagine this: A man creates a hydrogen bomb for a paranoid Soviet Union, makes sure

it will work, and then wins a Nobel Peace Prize! (Vonnegut, 1997; p.5). Apart from illustrating Kurt Vonnegut's wit and perhaps indicating a severe time-inconsistency in Andrei Sakharov's preferences, the story shows how history can be accessed by imagination. Within each of the moments of dynamic time, the entire personal and public history is brought into the reach of the individual, and so is the future (Shackle, 1954). For Shackle (1954), the mechanism that provides a *theoretical* connection between past, present and future moments is imagination. Here, it is important to note that Shackle abides with a rigorous application of dynamic time. For Shackle (1954), there is no possibility that the separate moments of dynamic time themselves can be brought into comparison. The connection between moments in time is purely theoretical since it is brought about by the individual's imaginative powers.

According to Shackle (1959), the mind has power to create images unaided by outside stimulus. Both past and present events can be entertained as images in the present moment. In an earlier work, Shackle (1954) refers to images of events and situations associated with past moments as *memory time*. The complementary freedom to create images and associate them with future moments is denoted *expectational time*. Since moments are distinct, imagination is not completely constrained by its antecedents. Put differently, because imagination is transient, its subject matter is essentially unbound. Therefore, imagination allows choice to be the cause of history rather than its antecedent. An interesting parallel that shares many features of Shackle's work on time and imagination is Boulding (1959). According to Boulding (1959), it is the awareness of being firmly located in a temporal process that sets human beings apart from most animals. The human being has an image of the past which extends far back beyond the limits of his own life and experience, and he likewise has an image of his future (Ibid., p.25). Moreover, Boulding (1959) asserts that the phenomenal capacity for internal growth and development quite independent of messages received from the outside is responsible for the greatest creative acts of man as well as the pathological states where whole imaginary universes are build without regard to any contradictory

messages. For Boulding (1959) and for Shackle, imagination and temporality leads to creativity in choice.

Shackle (1976; p.3) defines choice as an act that involves three formal essentials: (1) a set of elements distinct from each other, (2) a standing that can be conferred on any one, but only one of these elements, and (3) an origin and mode of this conferment. The key question for Shackle (1976) is the incompatibility between determinism and originative choice. Determinism is the view that history in every particular exists independently of human knowledge or initiative. In determinism, time is static and choices are not made, they exist (Ibid.). By contrast, non-determinism is defined in terms of newness. Whereas nothing is new in determinism and choice the mere effect of its antecedents, non-determinism is the view that choice, to some extent unfettered by the past, is the cause of history. As Shackle puts it, in a non-determinist view history is *the news* (Ibid., p.4, emphasis in original). By introducing dynamic time, Shackle (1976) opens the possibility for a conception of an alternative to deterministic "choice." Choices are made in the present moment characterised by its *ontological* isolation from the past and the future. According to Shackle (1976), non-determinism is obliged to envisage an origin and genesis *ex nihilo* for some elements of choice. Otherwise, choice would be the mere elaboration of the past. In dynamic time, the present moment has duration and each is distinct. Therefore, dynamic time from the perspective of the present is transient. It is the transience of the decision situation that allows uncaused causes to interfere.

But how can inceptive choice, the process of creation *ex nihilo*, be justified? Shackle (1976) provides the following elegant description. Non-determinism is the view that the present shows us a process of creation. (Ibid., p.6). Dynamic time allows choice to be the creation of history which takes place in the present. If choice is to escape a pre-determined cause, it must be the cause of, at least, some part of history. The part that makes the difference for Shackle

is imagination. Although Shackle admits that terms like randomness and inspiration explain nothing they can be used to justify the idea of inceptive choice.

It can be argued that rejecting inception is a rejection of choice itself. By contrast, accepting the idea of inceptive choice introduces the need to explain the process that brings the inception about. Furthermore, it is necessary to provide a link between the creative acts of the mind and the circumstances of the individual. According to Shackle (1976; p.10), that link "presents itself as a matter of the most elusive subtlety and complexity. The task of the individual imagination at all moments is to fill the void of time-to-come." In a sense, Shackle justifies the creation of thoughts, *ex nihilo*, by appeal to the restlessness of the mind itself. It is the restless mind, situated in dynamic time, which introduces the genuinely novel thoughts that eventually find their expression in choice. Dynamic time further lifts the binding constraint of the past and the possible since the present moment, in which choice takes place, by definition is cut-off from past and future moments. It is now clear why Shackle needs dynamic time. Dynamic time, introduces the distinctness between present moments allowing novelty to enter. Through dynamic time, choice becomes inceptive, it brings in "essential novelty, the unforeknowable." (Ibid., p.10).

Perhaps it should be noted that the notion of uncaused causes is problematic from a biological as well as a philosophical perspective. Based on Morin's (1973) foundational work on complexity theory and human evolution, it could be argued that a number of complex phenomena have characteristics that are hard to distinguish from uncaused causes. More generally, modern chaos theory and complexity theory show that there are instances, such as bifurcations, which we must treat *as if* they were an uncaused cause (Hodgson, 1999; pp. 147-9). As Hodgson (1999) notes, there are two major problems with uncaused causes. The idea rests uneasily with the attempts of modern science to find causal explanations, and it

seems to privilege humanity above all other animals. According to Hodgson (1999), the latter problem is further inconsistent with modern evolutionary biology, because the emergence of uncaused will on the evolutionary scene cannot be given adequate explanation. Since determinism and indeterminism are both associated with unpalatable features, Hodgson (1999) introduces a third alternative, emergence, according to which the world has to be treated as if it were indeterministic and unpredictable even if it is deterministic. Hodgson's (1999) solution has an important precursor in the influential biologist Monod's (1971) work titled "Chance and Necessity." As emphasized by Monod (1971), the idea of uncaused causes is intimately associated with dynamics. According to Monod (1971), a unique object has to be consistent with our theory (or we shall have to revise the theory). But it is in no way implied that all phenomena can be deduced or predicted from first principles. According to theory, the object has a right to exist but is under no obligation to do so. As Monod (1971) asserts, there seems to be a tireless and heroic effort in most religions, philosophies and even science to view human beings (us) as unavoidable, neccessary and at all times predetermined. Such predictions, according to Monod (1971), can only be static. When a truly dynamic view is adopted, chance plays an important major role *as* the (uncaused) cause of novel phenomena. Clearly, the idea of treating choice *as if* it involved uncaused causes is intimately associated with dynamics[vii].

In a dynamic world where choice involves novelty, a concern about regularities arises naturally. Choice is, in a very real sense, constrained and as Hodgson (1997) convincingly argues, social regularities are ubiquitous. In other words, imagination cannot be unbound. The flip side of the coin is that in a reasonable account ckoice can only affect reality if it is

[vii] The dispute between advocates for determinism and indeterminism has a long history in philosophy and the social sciences. Although key issues will have to be presented, the present article is not the place to enter the dispute. It should be noted, however, that there are forceful arguments also in favour of retaining the idea of slips in causation. For example, Castoriadis (1987) provides the following argument. "Causality means 'go together'. But if something goes together is it not he same? Then, if we acknowledge novelty (in the sense of not being the same), does it not imply that we have to acknowledge slips of causation?"

not entirely imagined. Shackle addresses this issue by elaborating the role of imagination in choice. The point of departure is the purpose of chocie, defined as bringing about enjoyment by anticipation (Shackle, 1954; 1958; 1976). The imaginative content of what is to come must conform to the world as the chooser sees it, "they must pass a test imposed by practical conscience for compatibility with the principles of Nature and of human nature, and with these principles in their application to the circumstances of the chooser's present, the posture of things present to his thoughts" (Shackle, 1976; p. 11). What limits imagination is the possibility of imagined actions. A choosable for Shackle (1976) is composed of an imagined sequence of actions and its sequel, the actual unfolding of those actions. To enter choice, a choosable must not be fatally obstructed to anything in the chooser's thoughts. Also, a chooseable must to some extent be more or less desired by the chooser. Choice for Shackle, then, is the identification of the most and the least desired of the possible imagined sequels. As Shackle (1976; p.23 succinctly puts it, choice makes a difference, "but this difference, for the chooser when he makes his choice, is between one set of permissible imaginations and another." Choice is a choice among incompatible imagined action schemes.

To sum up, dynamic time introduces the idea of a unique moment in which choice takes place. Inspiration, as an uncaused cause, influences choice by producing imagined actions. Then, desire and possibility intervenes to limit the set of choosables. An imagined sequel must be possible in the sense that it cannot completely contradict the world-view held by the individual. It must further be the most desired among the possible imagined sequels. The unexplained inspiration that is allowed to intervene in choice is bound by the subjective memories of past events involving other agents and the expected sequels of the imagined actions. Thus, imagination is constrained by the decision maker's world-view including the knowledge of how other agents act.

Shackle's description of decision making may be reconstructed as a three stage-process of

cognitive selection corresponding to the three kinds of imagination defined by Shackle (1959): (1) unlimited fantasy or day-dreams, (2) expectations, and (3) anticipations. The premise given by dynamic time is that each moment is in some sense unique. In the first stage, the situation invokes images created anew from some unexplained inspiration. In the second stage, images of actions are constrained by the limits set by the individual's beliefs about the world as they exist in the present moment. Thus, images are selected within a range of considered possible transformations of the existing situation between now and then. Shackle refers to this set of images as expectations. In the third stage, a further selection among these constrained imaginations occurs when the decision maker chooses and mentally commits herself to one possible course of action. Shackle (1959) describes this selection among alternative imagined courses of action as a process where constrained imagination becomes anticipation; i.e. an anticipated outcome of a decision is experienced beforehand.

Implications

Viewed from the perspective of the decision maker, creativity in a few decision makers may lead to unexpected and unprecedented successes and disasters. Modern psychology asserts that error types specific to the mode of operation introduces unwanted variation in action (Reason, 1990). Whereas error types associated with routine-operation are largely predictable slips and lapses, conscious decision making involves knowledge-based error types that are unpredictable and therefore difficult to detect and prevent. Knowledge-based errors are associated with unanticipated changes for which the decision maker is unprepared. Moreover, they are characterised by a high degree of variability.

Shackle's account of creativity in choice seems highly relevant as a complement to the work-space limitation which is the usual explanation for knowledge-based errors. Inappropriate

action sequences may well be caused by something like Shackle's unexplained inspiration combined with insufficient external controls. As inspiration interferes, it is likely that errors become hard to predict.

On a more general and positive note, Shackle's account of dynamic time introduces an interesting paradox by suggesting that deliberate choice is one of the most important sources of *unexpected* variation in economic systems. To understand what is responsible for alternative "amounts" of variation "produced" by deliberate choice seems an important implication. Put differently, the larger issue is the need to understand the deviation from social regularities caused by the novelty introduced in choice.

Social regularities enter decision making as relatively time-invariant structures (Knudsen, 1997). These social structures enable decision making by providing the necessary contextually sensitive information (Hodgson, 1998). By the same token, decision making is constrained by social structures. Decision makers cannot get a firm grip on entities for which concepts are lacking. As Boulding (1959; p.122) notes, Columbus would never have thought to sail west-ward had he not had an image of the round world. But how did the world get round?

Unless a dynamic perspective is applied to the interaction between agents and structures, it is very difficult to come up with an explanation for social change that avoids leaving change in the existing structures unexplained. It seems reasonable to grant social structures temporal primacy, but it seems unreasonable to grant them determinacy (Hodgson, 1999). If we accept Shackle's suggestion, that dynamic time introduces novelty in choice, social structures will always be influenced by the sequel of imagined action. This means that originative choice introduces action which to some extent will redefine the structural conditions that made it possible in the first place. Furthermore, social structures impose a second-order reality-check

on contemplated actions due to their imagined possibility. It follows that the amount of variation infused in social systems will decrease as social structures pose barriers to what can be imagined. By constraining imagination, creative acts will increasingly find an expression that reinforce existing social structures. Examples, such as institutions of marriage come easily to mind (see e.g. Durham, 1991). Shackle's account of originative choice suggests that the infusion of variation never ceases. Crucially, the constant infusion of variation leaves even very persistent social structures vulnerable to small changes in the underlying social interaction patterns responsible for their continuation across time. Moreover, the creativity of choice implied by dynamic time can be seen as a possible and perhaps inevitable source for such changes in social interaction patterns.

Dynamic time introduces the novelty which serves to make choice real and originative. By the same token, we arrive at a possible evolutionary account of social dynamics emphasizing the duality of inspired variation and structurally constrained imagination. Due to variation infused by novelty, structural change is inevitable, however, its rate may be slowed down by the regularities that work as sorting mechanism, discriminating possible and impossible imagined actions. As Boulding (1959; p.25) notes, the time structure of the image of the world is closely associated with the image of the structure of relationships. Moreover, it is the awareness of time which is the source of our awareness of "cause and effect, contiguity and succession, of cycles and repitition" (Ibid., p.25). According to this viewpoint, it is our awareness of relatively *time*-invariant relations and structures that provides the bounds necassary to make imagined actions relevant in circumstances that do not change too much and too fast.

At the same time, dynamic time allows choice to be originative. For choice to be effective in physical space, imagination needs concepts that correspond to the objective bounds of physical laws. To make a difference in social space, imagination needs to conform with the

objective bounds provided by enduring social structures. Since the very same social structures are subjectively perceived, the novelty which springs from originative choice may be the source of their change. From another angle, originative choice can be viewed as a mechanism that provides the necessary variation to cope with unprecedented change in the present situation.

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TABLES

Table 1:

Time Concepts - An Overview				
Time concepts	**Analogy/ metaphor**	**The nature of time**	**Time points**	**Time flows**
Static	Line	Compact, continuous and infinite ordered sequence of points (occurrences) and the points serve as limits between different stretches of time (processes).	Time points have no extension and are given equal significance	A line piece
	Arrow	A directed line	Irreversibility introduced	A vector
Dynamic	River	Time is change sui generis	Time points have extension (duration) and are distinct occurences that can be ordered according to a structure of past, present and future	The observer is unchanging but the state of the world is in flux
	Chronos	As above	As above	The observer is in flux but the state of the world is unchanging
	Container	Time contains events	---------	---------

Footnotes