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Towards a concept of dynamic fit in contingency theory

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This paper utilizes Systems Dynamics (SD) methodology to preliminarily assess recent dispositions for dynamics and disequilibrium in Contingency Theory (CT). These are important, since CT has received continuous critique for being insufficient in explaining structural adaptation. Focusing on the design process, our analysis finds that these dispositions seem to have substantial potential for dealing with dynamics. However, we also find that existing CT research strategies on organizational fit are rendered inapplicable to such dealings. We therefore propose a concept for dynamic fit and sketch two different strategies for its implementation in future CT research; one for axiomatic and one for applied research. We conclude the paper with an agenda for future research, demonstrating the role which SD may play in its implementation.*

Key words: Structural organization design; Contingency Theory; Systems Dynamics; Fit; Viability

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0.0 Introduction

This paper analyses recent concerns for disequilibrium in contingency theory (CT) and builds a concept of dynamic fit, utilizing System Dynamics (SD) methodology.

CT remains the dominant approach to organization design (Lawrence 1993:3) and the most widely utilized contemporary theoretical approach to the study of organizations (Scott 2003:97).

The basic proposition of CT is that organizational viability is contingent upon a fit between organization and environment. The fit concept plays a critical role (Drazin & Van de Ven 1985) and lies at the heart of CT (Donaldson 2001).

Being a theory of organizational adaptation, the basic research problem of CT is inherently dynamic. The concepts of fit applied in actual research, however, are static. Relying on classical comparative analysis, they assume equilibrium positions in time and space. This leaves a gap between the applied ontology in CT research, and an ontology necessary and sufficient (Dubin 1978) for explaining the research problem.

However, recent developments in both axiomatic and applied CT research show a concern for dynamic disequilibrium (Klaas 2004). We consider these concerns within an SD framework. Then we depart from these dispositions towards building a concept of dynamic fit, which we term vector fit. We then proceed to suggest at least two possible future CT research strategies, utilizing vector fit.

The paper is organized as follows. First, we offer a brief review CT and its principal research problem. In section two, we present and discuss current fit concepts and their implementation in CT research; then we discuss the design process. In section three, we review recent dispositions for dynamics in CT research, moving on to assess them in a SD framework. We find that they have potential for explaining dynamics; but leave standard CT implementation of fit, presented in section two, inapplicable. We therefore propose a concept of dynamic fit in section four. In section five, we suggest two different strategies for implementation of vector fit; one for axiomatic and one for applied research. Section six concludes the article with a brief discussion of the findings, proposing an agenda for future research.

1.0 Contingency Theory

CT is concerned with the role of structure in organizational performance. In a normative perspective, the principal research problem becomes one of identifying structural designs which are efficient, effective and viable under conditions of changing environments. Efficiency, effectiveness and viability thus become the criteria (Burton & Obel 2004) against which different designs are validated.

The term contingency theory was coined by Lawrence & Lorsch (1967), in an empirical study, showing that effects from organizational structure on relative economic performance were contingent upon environmental attributes. CT thus offered a synthesis of two conflicting research paradigms in organization theory, both claiming universal virtue: the differentiated, efficient factory system of Adam Smith and the integrated, effective human system of Emile Durkheim. According to Lawrence & Lorsch (1967), organizations had to be *both* differentiated *and* integrated to an extent of optimality, which was contingent upon the level of environmental uncertainty.

In CT terminology, variables such as differentiation and integration are termed contingency factors, or simply contingencies. A “contingent” proposition is one which hypothesizes a conditional association of two or more independent variables with a dependent outcome (Fry & Schellenberg 1984). In the case of Lawrence & Lorsch (1967), then, differentiation, integration and environmental uncertainty are independent variables; economic performance is the dependent outcome.

Over the years, CT research has hosted an overwhelming number of different contingencies on which organizational viability is thought to be dependent. Classic examples are structural centralization, specialization and formalization (Blau 1970); strategy (Miles & Snow 1978); technology (Woodward 1965); task uncertainty (Perrow 1967); organizational climate (Burton & Obel 1998); national culture (Burton & Obel 2004); incentive schemes (Burton & Obel 1998); managerial cognition (Døjbak 2003); size (Blau 1970) and structural configuration (Mintzberg 1979). CT research is conducted on both the organizational and sub-organizational level of analysis (e.g. Van de Ven & Delbecq 1974; Gresov 1989; Keck & Tushman 1993).

While early research produced a large number of bivariate relationships, involving single contingency, later developments sought contribution through the integration of early research into more parsimonious models. One approach relied on multi-contingency models (Gresov 1989; Burton & Obel 1998, 2004). Within this approach, the Gestalt (Miller & Friesen 1980a, 1980b, 1982, 1984) or Configuration (Mintzberg 1983) approach gained momentum over the nineteen eighties, culminating in an Academy of Management Journal special research forum in 1993. Another approach, neo-contingency theory (Donaldson 2001), sought parsimony through reductionist integration of multiple contingencies into a more abstract, theoretical model involving three principal contingencies: size, task uncertainty and task interdependency. These attempts of integration, however, did not affect basic methodological approach much, beyond moving from bivariate to multivariate comparative analysis.

Within an overall process of convergence, CT currently seems to diverge towards two sub-streams. Neo-Contingency Theory (NCT) (Donaldson 2001), is more concerned with axiomatic issues, while the Neo-Information Processing View (NIPV) (Burton & Obel 1998, 2004), seems more concerned with issues of application. In recent developments, however, both streams show a clear concern for dynamic disequilibrium. We will discuss some causes for this concern further in section 3.

2.0 Fit concepts and the structural design process

The concern for viability as the principal design criteria in CT stems from its ontological framework, imported from biology. General systems theory was formulated by biologist von Bertalanffy (1956), and introduced to organization theory by Katz & Kahn (1966). Like living organisms, the principal goal of human organizations therefore becomes survival and growth, i.e. viability. What causes viability to be so important is that organizations, as open systems, are completely dependent on environmental resources to sustain them selves; but these are scarce and therefore competition exists.

A system is viable at any time, if it has a stock of resources which is not negative. In organization theory, such resources can conveniently be thought of as stocks of capital or profit (Hage 1974). It follows that maximizing such stocks maximizes viability, and "there is then a general trend in an open system to maximize its ratio of imported to expended energy [capital], to survive and even during periods of crisis to live on borrowed time" (Katz & Kahn 1966:19) (brackets by the author).

In accordance with the above, CT research generally relies on financial measures as a proxy for viability. Among these, return on assets (ROA) is one of the most widely used profitability ratios in organizational and strategic analysis (Hax et al. 1984). ROA is calculated as

$$\mathrm{ROA} = (\mathrm{PROFIT}/\mathrm{ASSETS}*100)\ \%. \qquad (1)$$

In SD terms, we would think of ROA as the rate of change in a stock of assets, i.e.

$$\mathrm{ROA} = d(\mathrm{ASSETS})/dt = \mathrm{inflow}(t) - \mathrm{outflow}(t). \qquad (2)$$

Having established the adaptive role of critical stocks such as assets, these are then outcomes, or the dependent variable, of a contingency proposition, as defined in the previous section. Outcomes of viability are seen to be contingent on a fit between the organization and the environment, from which it imports its critical resources. This notion of fit is another central concept imported from Darwinian biology. The idea is quite familiar: the better an organization is adapted to, or fits, its environment, the more successful it will be.

The basic research strategy of CT, then, is to show that structurally fit organizations perform financially better, than those in misfit (with statistical significance). Stated differently, deviations from a fit design will decrease economic performance accordingly. Such deviations are calculated in different ways, depending on the chosen research design. CT research has received widespread critique for not being clear about applied research designs and their validation (Schoonhoven 1981, Mohr 1982, Tosi & Slocum 1984, Fry & Schellenberg 1984, Fry & Smith 1987, Scott 2003). In an attempt to meet critiques, Drazin & Van de Ven (1985) identify and explicate three different forms of fit in CT, of which only two address the link to performance. We will discuss these next, in sufficient detail to explain the important attributes of the concept.

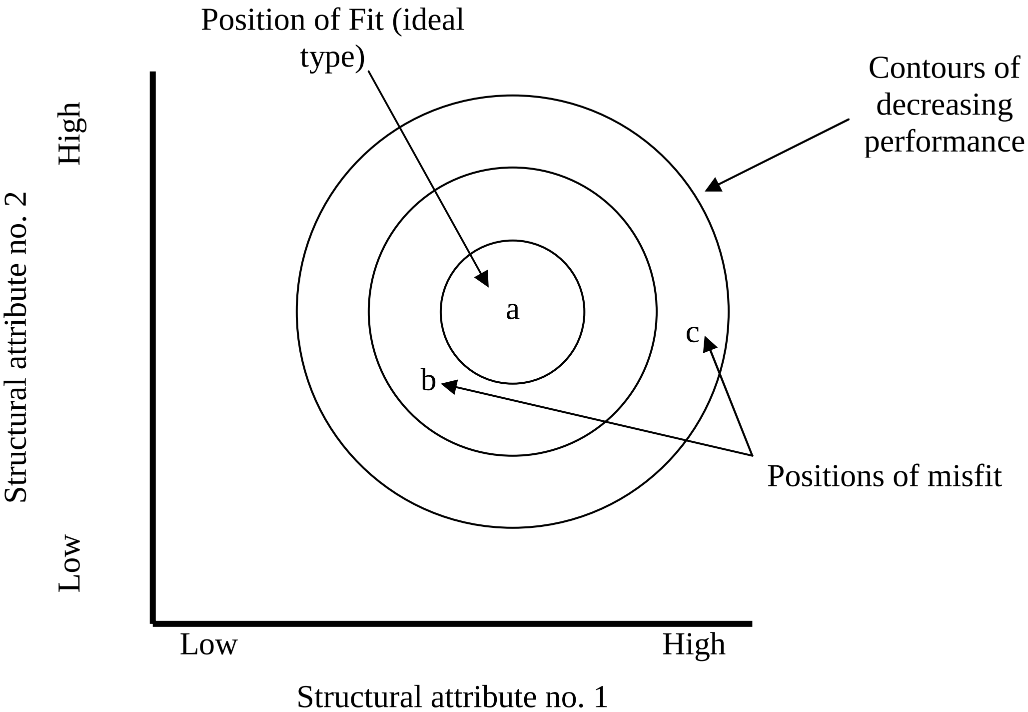
The first of the two is based on the earlier mentioned gestalt approach. It focuses on internal fit between different attributes of the organization, together forming its gestalt or configuration. It is essentially a qualitative approach, relying on classification of different structural attributes. The basic idea is that these go together in a limited number of natural combinations, being fit gestalts. These gestalts are considered ideal types, following Weberian (1963) analysis. With ***n*** structural attributes, there are ***n!*** different possible combinations; the research strategy is to identify the limited number of viable gestalts, the ideal types, within the ***n!*** possible ones. The approach thus assumes that attributes can be meaningfully interpreted as being discrete (categories). We show an example of a typical gestalt approach in figure 1 below, based on Drazin & Van de Ven (1985).

In fig. 1, an ideal type organization, for simplicity consisting of two structural attributes, is considered. Position ***a*** is the fit position of this ideal type, while positions ***b*** and ***c*** represent positions of misfit. Typically these are measured through asking how closely an actual attribute resembles the ideal type; respondents assessing this on a Liekert type scale. CT expects financial performance to decrease, as the distance between a position of fit and one of misfit increases. Let ROA_a denote the return on assets resulting from an ideal type position of fit, ***a***, then ROA_a is the (local) optimum, and

$$ROA_a > ROA_b > ROA_c \qquad (3)$$

has been shown to be statistically significant.

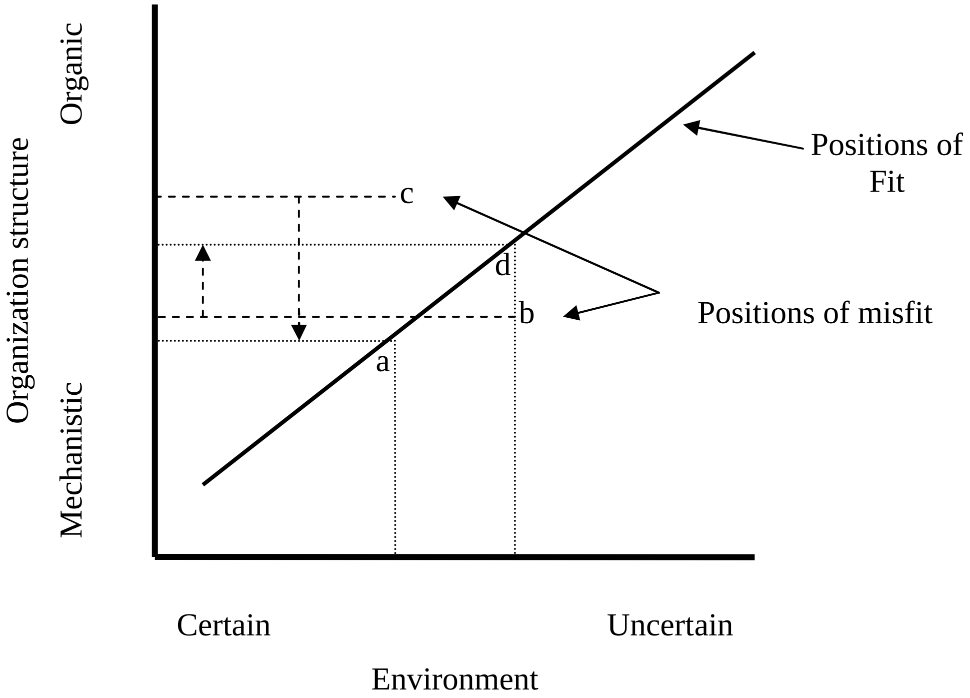
Fig. 1: Measuring fit in the gestalt approach (after Drazin & Van de Ven 1985)



The second approach to fit assumes that structural attributes are of continuous nature. In very early CT research, Burns & Stalker (1961) defined the mechanistic – organic continuum of management style. This idea has had tremendous impact in CT thinking. Drazin & Van de Ven terms this approach the interaction approach, and we shall follow their terminology here. While the gestalt approach has more focus on internal fit, the interaction approach has a higher concern for external fit, i.e. the relationship between the system and its environment. The basic research strategy in this case is to identify the relevant environmental and structural contingencies which form conditional associations with the dependent financial outcome; and, having done so, to identify the parameter settings of the contingency variables which lead to positions of fit along some sort of continuous graph, such as a straight line.

In fig. 2 below, we illustrate Burns & Stalkers (1961) classic continuum. A "mechanistic" structure is formal, differentiated and highly efficient; an "organic" is informal, integrated and highly adaptive. As environmental uncertainty increases, the structure should become increasingly more organic, to remain fit. Positions ***a*** and ***d*** are both fit positions. Positions ***b*** and ***c*** are both positions of misfit. Since it is assumed that environmental attributes determine viability effects from structure (Donaldson 1996), the designer is left only to design structural attributes. Therefore, in the case of misfit position ***b***, the design is overly mechanistic, given the level of environmental uncertainty; in position ***c***, the design is overly organic. By the length of the corrective arrows we infer, as was the case in fig. 1, that $ROA_a > ROA_b > ROA_c$. Note that it is assumed (Donaldson 2001) that $ROA_a = ROA_d$. This assumption is also made in the gestalt approach, where different ideal types obtain the same degree of viability.

Fig. 2: Measuring fit in the interaction approach



Having explained the role of viability and the resulting fit concept in CT, we can summarize the basic research strategy of CT in table 1 below. This strategy is pursued empirically through classic comparative analysis.

Table 1: The basic implementation strategy of CT research

Type of design	Design ***a***	Design ***b***
ROA with type of design	Positive / relatively higher	Negative / relatively lower
Design criteria	Fit	Misfit
Resulting design recommendation	Adopt the design	Abandon the design

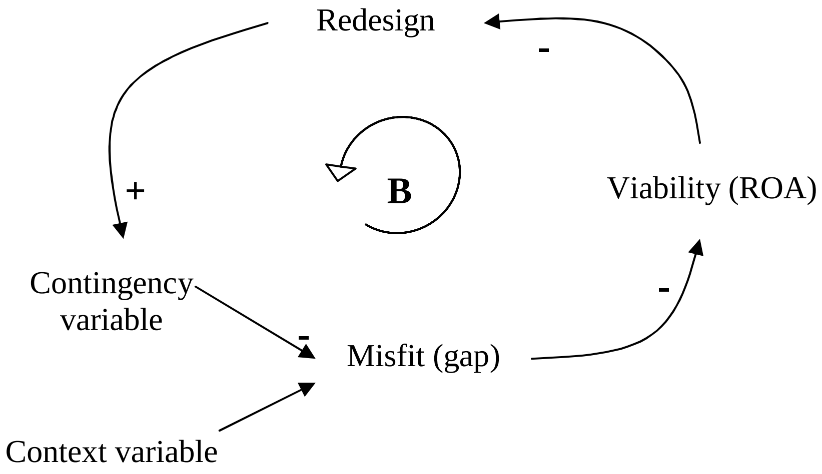
Donaldson (2001) continues the clarifying discussion of the fit concept in CT; for a deeper discussion of the interaction and gestalt approaches, see Meyer et al (1993) and Donaldson (2001).

2.1 The design process

Design can come about by two different processes. The first is natural design, through a process of genetic variation, environmental selection and retention. This type of design process is assumed in population ecology theory (Hannan & Freeman 1977), a paradigm challenging CT (Donaldson 1996) explanations of organizational adaptation. The second is deliberate design, driven by the rationality of a conscious designer. CT, of course, assumes the second type of design to be of importance. But how exactly is this process of deliberate design? In fig. 3 below, we use SD notation to depict the basic functioning of the design processes, as established by Donaldson's SARFIT model (1987) and Burton & Obel's (1998, 2004) strategic design models.

The process is derived in a straightforward manner from the concepts of viability and fit, discussed above. As a gap between actual and ideal design increases, ROA decreases. This creates an economic incentive to redesign structural contingencies (since the designer cannot control the context), closing the gap and resuming a fit position, causing ROA to pick up. Using SD notation, we note that the system is controlled by negative feed-back, stabilizing the system in equilibrium; following the taxonomy of Boulding (1956), it is then a cybernetic system.

Fig. 3: Traditional homeostatic CT design process model



3.0 Dynamics and disequilibrium in Contingency Theory

As we noted at the end of section 1.0 in our introduction of CT, there is a recent concern for dynamics and disequilibrium. We will introduce some of these here, and then asses their implications.

Donaldson (2001) asks the simple question of why the organization should move out of fit into misfit in the first place: the move is just a given. In traditional CT there is no incentive to move out of fit, since the line of fit positions (see fig. 2) is one of iso-performance (Donaldson 2001); different fit positions yield the same ROA.

Donaldson (2001) moves on to suggest that high financial performance, resulting from fit, causes increases in contingencies such as size (a phenomena which Blau demonstrated theoretically in 1970), creating a misfit in the process. In SD terms, Donaldson introduces positive feed-back, or a reinforcing loop, to the CT design process model shown in fig. 3. He then introduces the idea of a quasi-fit line, based on the concept of bounded rationality (Simon 1957). Managers cannot identify the optimal design on an iso-fit line (as depicted in fig. 2), nor do they have to; it is enough to attain a satisfactory level of fit, allowing the organization sufficient resources to sustain growth. Fit is not a line, it is a corridor.

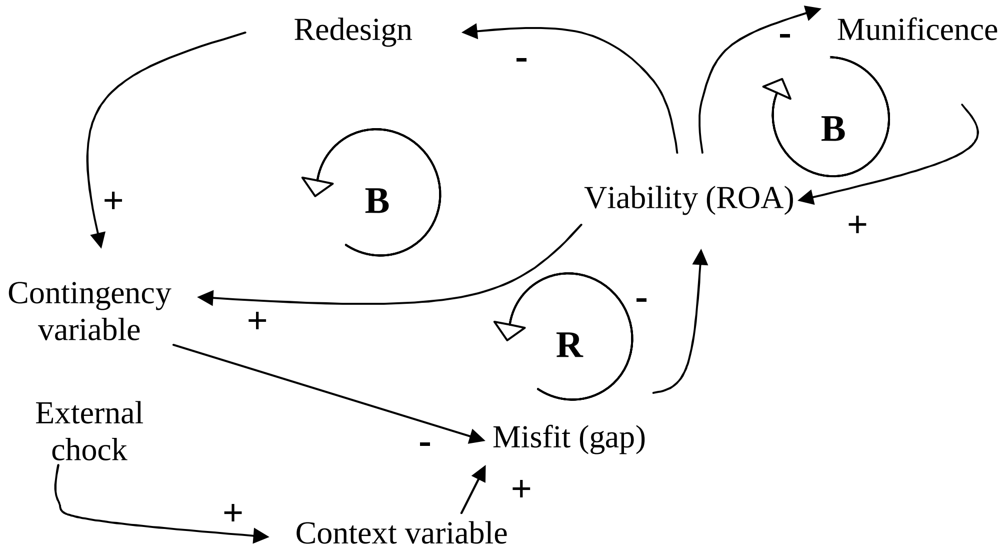
Further, Donaldson (2001) acknowledges that ROA may be due to factors, other than those traditionally considered in CT, e.g. competition in the business environment. This acknowledgement seems important in an open system framework perspective, since system viability relies on access to external resources; the extent of such resources must therefore be expected to influence ROA. Environmental resource availability has been introduced to organization theory by March & Simon (1958), terming it munificence.

Like Donaldson (2001), Burton & Obel's (2004) discussion departs from the basic question: what triggers a misfit? They posit that there are two fundamental sources; external chocks and internal, managerially initiated changes; we will discuss the latter later in this section. External chocks are changes in context variables such as technology or uncertainty. Such external chocks do not add to the dynamics of the design process, but it does explain why a cybernetic system would reposition itself to another equilibrium position of the iso-fit line, discussed earlier.

Having presented recent dispositions for dynamics in CT research, we utilize SD notation to consolidate these dispositions into an extension of the traditional CT design process model, presented in fig. 3. Fig. 4 below exhibits a SD model of CT design process.

Compared to the model in fig. 3, we first extended the traditional model with a positive feed-back loop, leading an increase in ROA to cause an increase in contingency variables such as size. As business picks up, managers hire more employees, causing size to increase. This proposition was forwarded by Donaldson (2001), discussed above. He further proposed that environmental munificence would play a role in determining ROA; as munificence increases, so does ROA. Relying on well established assumptions in Industrial Economics, we propose that increases in ROA will attract competitors, over time causing increases in competition, or, what comes to the same, a decrease in munificence. Together, these two forces create a balancing loop in the design process. Last, we incorporate the proposition from Burton & Obel (2004) of external chocks, causing a change in the context variable; this change causes a misfit, activating the traditional design process SD model in fig. 3.

Fig. 4: CT dynamic design process model



Formalizing the recent CT propositions of dynamics into an SD model, allows analysis of expected behaviour in the new system. Different from the system in fig. 3, the system in fig. 4 has indeed the potential to exhibit dynamic behaviour of disequilibrium. ROA is the objective function of the system to be maximized, or at least satisfied, for reasons discussed in section 2. The state of the system is therefore defined by the stock of its assets. The model above allows this stock to engage in growth, decline and homeostasis, showing the variables and relationships leading to such behaviour.

From this theoretical analysis in a SD framework, we may preliminarily conclude that recent propositions in CT have important potential for closing ontological gaps, for which CT has received critique. But what are the implications from such propositions on the CT fit concept?

Returning to the discussion led by Burton & Obel (2004), they continue their analysis to suggest that design changes can stem from managerial ***anticipation***, trading short term fitness for longer term fitness. They build from a model of strategic fits and misfits by Zajac et al (2000). The basic argument in this model is as follows: changing a business strategy will, since it takes time to redesign a structure, create a misfit between new strategy and old structure. But if strategic changes occur in the business environment, the new strategy/old structure misfit is actually a strategic fit, because it is an intermediate position en route to a fit between a new strategic business environment, a new strategy and, in time, a new appropriate structure. If, on the other hand, a new strategy is adopted in an unchanging business, the created strategy/structure misfit is a strategic misfit. In short SD terms, lags are introduced to the system.

Such ideas radically break away from notions of fit as being temporal and spatial positions, fundamental to existing fit concepts in CT as presented in section 2. If the ideas are to be pursued, it leaves the current research strategy on fit as depicted below in table 2.

Table 2: Impacts from process ontology on standard implementation strategy of CT research

Type of design	Design ***a***	Design ***b***
ROA with type of design	Positive / relatively higher	Negative / relatively lower
Design criteria	Fit	(misfit is actually a) Fit
Resulting design recommendation	?	?

The table illustrates that research designs in CT, as reviewed by Drazin & van de Ven (1985) and Schoonhoven (1981), are inapplicable. If assuming that positions of poor performance may actually be an intermediate position of fit, in a process of e.g. strategic reorientation, then comparative analysis of such positions cannot discriminate between viable and unviable designs.

For some industries in today's environment, it is likely that the fit [i.e. traditional CT positions of fit] is never obtained, but remains an elusive ideal (Burton & Obel 2004:399) (brackets by the author). If this is the case, then how can we implement CT research?

4.0 Vector fit

Once again relying on SD methodology, we propose vector fit as a CT concept of dynamic fit.

The idea is simple. We suggest abandoning analysis of financial effects of contingent designs in certain positions; instead to analyze accumulated financial effects from contingent designs, changing over time through intermediate positions on a vector. Such positions are thus allowed to be of poor financial performance. Formally, in SD terms, we would transform (2) into

$$\text{ASSETS}(t) = \text{INTEGRAL}(d(\text{ASSETS})/dt + \text{ASSETS}(t_0)). \qquad (4)$$

The basic research strategy turns into one of identifying different design vectors, linking them to resulting stocks of assets while controlling for initial stocks.

We exemplify vector fit in fig. 5 below. Think, for simplicity, of a design which consists of five parts, e.g. strategy, centralization, culture etc. Each part can take on two values, one or zero. For instance, strategy could be either a cost leadership or a differentiation strategy; centralization could be either centralized or decentralized; culture could be one of either efficiency or innovation etc. Assume that, to stay adaptive, the organization has to change from a (11111) configuration to a (00000) configuration. The cost of change for each part is different, as are their contributions to financial performance. Assume also, that they must be changed sequentially, since resources are limited. In this way, there exist a number of different change sequences, or design vectors.

In fig. 5, we have shown two different vectors; each time a design part is changed, we have marked this with an underscore (i.e. **$\underline{0}$**). These have different effects of costs and benefits, resulting in different accumulated stocks of assets, or fit vectors. It is now possible to link different design vectors with their financial performance.

Fig. 5: An example of two different design vectors

		Design (five sub parts, A through E)				
		A	**B**	**C**	**D**	**E**
Time period	t_1	1	1	1	1	**0**
	t_2	**0**	1	1	1	0
	t_3	0	**0**	1	1	0
	t_4	0	0	**0**	1	0
	t_5	0	0	0	**0**	0
Time period	t_1	1	1	**0**	1	1
	t_2	**0**	1	0	1	1
	t_3	0	1	0	1	**0**
	t_4	0	**0**	0	1	0
	t_5	0	0	0	**0**	0

Having done this, it is once again possible to rely on comparative statistics to discriminate between viable and unviable design vectors, resulting in design rules under terms of dynamic disequilibrium. If $\text{ASSETS}_{\underline{a}}$ denotes the accumulated stock of assets from design vector $\underline{\boldsymbol{a}}$, we note that the relationship

$$\text{ASSETS}_{\underline{a}}(t_i) > \text{ASSETS}_{\underline{b}}(t_i) > \text{ASSETS}_{\underline{c}}(t_i) \tag{5}$$

must be shown to be statistically significant, parallel to expression (3).

Having presented and explained vector fit as a concept for dealing with dynamics in CT, we can summarize the proposed new research strategy of CT in table 3 below.

Table 3: Implementation strategy of CT research in dynamics and disequilibrium

Type of design vector	Design vector ***a***	Design vector ***b***
ASSETS(t) with type of design	≥ 0 / relatively higher	< 0 / relatively lower
Design criteria	Fit	Misfit
Resulting design recommendation	Adopt design vector	Abandon design vector

Such approaches, utilizing SD dynamics, allow research designs to deal with important elements of dynamics, such as equifinality, path dependency and time lags; elements all known to play important roles in theories of organizational adaptation.

In the nest section, we sketch two future CT research designs for dynamics and disequilibrium.

5.0 Future research

In our introduction of CT in section 2, we noted that CT currently seems to crystallize into two sub streams. One is concerned with managerial application and embraces gestalt theory assumptions, i.e. the idea that viable organizational designs are made up of a limited number of ideal types. Another is more concerned with axiomatic research and embraces the Burns & Stalker (1961) continuum view. Here we will briefly develop proposed future research strategies within the two streams, departing from the vector fit concept.

In the discrete view of gestalt theory, one would expect there to be only a limited number of design vectors, or “ideal vectors”. The basic research strategy, having established a finite number of ideal type designs, would be to identify which gestalts are naturally linked together, maybe through some adjacency logic based on economies of information; and which are not. Arrow (1974), in discussing three basic characteristics of information costs, note that they are by no means uniform in different directions (1974:41). This observation leads to hypothesize that different design vectors have different costs and hence affects stocks of assets differently. This research strategy could be implemented through classic comparative analysis, applying longitudinal designs.

We suggest that findings from this research strategy would tend to result in intuitive, predictable results. This is because the approach relies to a large extent on classification, be it typologies or taxonomies (see Meyer et al (1993) for a discussion). Classifications are useful, but not theory (Wilson 2000).

In the continuum view, we expect there to be a vast number of viable vectors. The basic research strategy, having established a very limited number of state variables and their relationships (which may be non-linear), would be to examine fit vectors as a function of different parameter value settings, within their specified boundaries. This is a vastly complex matter, unsuitable for comparative analysis. A more feasible way would be to embrace development and simulation of SD computational models. The results from such analysis could next be di- or polychotomized into more general design propositions, suitable for empirical testing of the theoretically derived design propositions.

However, since the resulting design propositions stems from application of formal theory, they could be different from, or at least extend, those derived with the gestalt approach. Thus we suggest that the continuum approach has the potential to produce surprising and even counterintuitive results, hallmarks of good theory (Lave & March 1975, Wilson 2000).

6.0 Discussion and conclusions

CT has received continuous critique for applying an unclear and insufficient ontology to its research. The fundamental problem seems to be the application of static analysis, assuming states of equilibrium, to a research problem which is essentially dynamic.

However, recent concerns in CT research have displayed dispositions towards a more dynamic ontology. In this article, we have assessed these within a SD methodological framework. We find that they have the potential to bring about the necessary ontological transformation, from one of substance to one of process. We then move on to suggest a new concept of fit, which is compatible with process ontology. In the process, we believe to have shown how SD can act as a helpful methodological tool in achieving transformation from static to dynamic analysis.

By introducing the stocks and flows of SD to CT ontology, it is equipped with memory, delays and system states (Sterman 2000). Such attributes, in turn, expands the possible future research agenda of CT considerably, allowing it to meet reported critiques as well as extending its scope of explanation and application; principal goals of positivist and normative research.

Among these possible research items are *fit as sufficient vectors*; viability is suggested to be a path of accumulated profits over time. The path is not expected to be optimal, but satisfactory; it is not, as hitherto in CT, a line, but a broad band or corridor. A path is satisfactory if it allows the organization to sustain itself and grow over time, i.e. to pursue its design vector. Very importantly, positions of poor economic performance may be an adaptive part of a viable vector, allowing designers to trade short term viability for longer term viability.

Multiple determinants of organizational viability. CT holds that organization structure plays a critical role in the utilization of environmental resources. But it cannot supply these resources by itself; it is dependent on imports from the environment. If no environmental resources are present, no viable design exists. The boundaries of CT wait to be specified; the relation between role of structure an other determinants of viability has yet to be examined.

Delays and timing. Time lags are important sources of dynamic disequilibrium. Time lags of more than ten years have been reported in CT (Donaldson 2001), and timing is an issue in design (Burton & Obel 2004). Lags cause design policies to have different short and long term effects; SD would expect CT design policies to effect a short term deterioration of financial performance, before picking up in the longer term. But if stocks of assets are limited, such behaviour puts important restraints on design decisions. These wait to be specified in appropriate design rules.

Experience and path dependency. The information processing capacity of a structure is largely determined by its experience (Galbraith 1977). Two organizations, contingencies *ceteris paribus*, but with different histories, may therefore be expected to have different potential for future viability as well as different satisfactory future design vectors. History is expected to constraint future possible designs, even to the extent that no viable future exists. What are the implications from experience on design rules?

Equifinality. Even if constraints due to history exist, different system states can lead towards similar viable long term states. Design is thus expected to involve focal organization history as contingency influencing future fitness vectors, which may be multiple. Equifinality relaxes path dependency to be less than determinate, leaving discretion for a designer.

Positive feed-back. Amplifying effects from recursive causal relationships, such as between size and profits, are key to dynamic disequilibrium. Increased performance, from munificent positions on a fit vector, feeds back to increase contingencies such as size. This, in turn, causes performance losses, having to be dealt with in design. How can we help designers to assess future states of their structure?

Process ontology methodologies. Valid implementation of ontology, of course, is contingent upon methodological reflection of its important attributes. Issues of temporal and spatial complexity are largely inaccessible with comparative statistics (March 2001:xv). Simulation represents an approach that appears both to match the phenomena of interest and to provide some analytical power (March 2001:xvii). Computational modelling is neither new to organization theory, nor to CT. Simulations of CT models in SD software does seem like an obvious option in developing the future research agenda of CT, with both axiomatic and managerial applications.

Contingency Theory has a very fertile past; its future looks even more so. Here, we have attempted to demonstrate the important role that SD may play in that future.

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