Structure, Agency, and Resilience

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Abstract. Giddens' structuration theory is a practice theory widely used and adapted in analyzing social and sociotechnical systems, but has not been applied to the notion of resilience in systems. Discourses on resilience have tended to focus either on agency or structure. Structuration theory gives a different view, of structure and agency as mutually constitutive. This view helps clarify the tradeoffs that often arise pitting stability against change, procedure against innovation, or standardization against contingency, by viewing them as inseparable and dependent aspects of a duality.

The view from any given observation point simultaneously reveals and obscures.
D D Woods

1 INTRODUCTION

Discourses about resilience tend to emphasize actions of agents in complex, adaptive, sociotechnical systems – how they anticipate or detect threats (or opportunities), and how they take action to forestall (or facilitate) them. Woods describes this as "... responsible people step[ping] into the breach of otherwise brittle systems to overcome adaptive shortfalls" (personal communication). This is a natural view of resilience, given that human actors are the most adaptable elements of any system, and will always be the 'last resort' when other elements or properties are falling short.

However, two potentially misleading ideas can flow from this view. The first is an attribution bias, the tendency to express critical events in the form of heroic narrative. This tendency, combined with people's inability to articulate their tacit knowledge, can give resilient interventions and the agents enacting them a magical, mythical quality – divinely inspired 'bolts from the blue' – that fails to illuminate supportive resources, or the conditions evoking them, much less providing guidance on how to ensure these capabilities.

The second is an implication that systems of work are implacable and unevolving, which, by viewing people as the only malleable resource, limits notions of what is possible. This is often true over short time spans, but it ignores the role of constraints as causes (Vicente, 1999), as shapers of behaviour, and thereby narrows the 'workspace' for resilience engineering.

While the resilience literature shows a sensitive awareness of the role played both by agents' knowledge (tacit and explicit understandings of situations, constraints, goals, means, threats, opportunities, *etc*) and their context (physical, technical, social, and historical) in performance, the role of structure tends to be unarticulated with respect to that of agency. Le Coze raised this question indirectly in his criticism of a model of resilience dynamics (Wears, 2011), noting that the model 'has no people in it' (personal communication). The remark led to an exploration of the reflexive relationship between structure and agency and the importance of acknowledging the reciprocal determination of both structure and performance.

In this paper, we draw on Giddens' structuration theory (Giddens, 1984) to highlight the dynamic relationship of structure and agency in resilient performance, and argue for the value of adding this viewpoint to enhance the prospects for resilience engineering.

2 STRUCTURE AND AGENCY

2.1 Sociological Roots

Giddens' notion that social phenomena are the result of a dialectic relationship between social structure and human action is rooted in a long history that he carefully explores. Since the beginning of social theorizing two major traditions put forth competing perspectives of social systems. Structural sociology emphasizes the importance of the social whole over its individual parts. Explanations of social behavior highlight the structural conditions that shape human action predominantly in the form of constraints (Giddens, 1984). The explanation of causal relationships between social structure and behavioral outcome favours a deductive approach in which objectivity becomes a prime concern.

The interpretive tradition argues that, "the study of human behaviour is the study of human lived experience" (Prus, 1996, p. 9). Rooted in Dilthy's hermeneutical approach but also drawing on the Weberian notion of *verstehen*, interpretive sociology highlights the importance of self-reflexivity -- the subjective understanding of peoples' meanings,

interpretations, activities and interactions. From this perspective, social behaviour is best understood when looking at the actions and motivations of individuals rather than considering the effects of social-structural constraints. Approaches associated with this paradigm are largely inductive and as such capable of capturing the subtle nuances that provide insight into the multi-perspectival nature of social life and human inter-subjective experience.

With two traditions this fundamentally different Giddens (1984) set out to "put an end to these empire-building endeavours" (p. 2) to prioritize neither the individual actor nor the structural-functional aspects of the social whole. Instead, Giddens considers their dialectic relationship. As a result, structuration theory proposes that human action as a continuous flow of conduct, or a *duree* (p. 3), is intertwined with the reproduction of the structural conditions that support social activities to become social practices, which are maintained across space and time as routines.

Offering a complex and intriguing conceptual framework, albeit with little methodological direction, structuration theory has been celebrated in the field of sociology for nearly 30 years. It has also gained traction in other domains including information systems research (e.g. Greenhalgh & Stones, 2010; Rose, 1998) and healthcare (e.g. Hardcastle, Usher, & Holmes, 2005; Beringer, Fletcher, & Taket, 2006).

2.2 Elements of Structuration Theory

Giddens' structuration theory of social action is one of a body of practice theories (Nicolini, 2013; Schatzki, Knorr-Cetina, & von Savigny, 2001) which claim that society is better understood in terms of a recursive duality of structure and agency. Within this recursive duality, human actors perform intentional actions and have the power and "the capacity to make a difference to a pre-existing state of affairs or course of events" (Giddens, 1984, p. 14). Being able to affect transformation and change people produce social systems employing rules and resources (structures) during interaction (agency), knowingly or unknowingly reproducing these structures in practice by routines that are generally taken-for-granted (Hardcastle, Usher, & Holmes, 2005). Giddens (1984) argues that social systems as reproduced social practices exhibit what he calls "structural properties" which, if maintained over long periods of time and space become the foundations of institutions. As Bellah et al. (1991) so eloquently describe, "we form institutions and they form us every time we engage in a conversation that matters" (p. 12). Crucial to the notion that social reality is actively and intentionally produced and reproduced is the presence of a recursive relationship where neither structure nor action can exist independently (Giddens, 1984). The argument we present here is that the articulation of this mutually constitutive and dynamic relationship between agency and structure forces trade-offs and fosters brittle/resilient action.

2.3 An Analogue from Biology

An example from biology may make the duality of structure and agency a bit more easily grasped. Observers of social insects had to explain a 'coordination paradox' – by what means are the complex social, behavioural and physical manifestations of insect societies organised, controlled, and regulated, give the severely limited cognitive facilities of their constituent individuals? Grassé developed the concept of *stigmergy* – artefact-mediated collaboration to explain this (Grassé, 1959). For example, an ant returning to the nest with food lays down a pheromone trail (different from the one she produced on the outward journey), thus modifying the environment. Other ants noting this in their wanderings are led to the food, and reinforce the trail on their return, eventually leading to coordinated action to retrieve food. As the food items are diminished, the pheromone production stops, the trail decays, and the ants resume their apparently aimless wandering. The concept of stigmergy has been progressively expanded beyond its relatively limited origins in insect societies, and applied to higher order coordination in economies and human societies as well (Doyle & Marsh, 2013; Susi & Ziemke, 2001). Fundamentally, stigmergy illustrates the recursive nature of structure and action – people take actions based on existing structure; by those actions, structure is reinforced and/or modified, and by those reinforcements / modifications, future actions are influenced.

2.4 An Example from Healthcare

An illustrative example of the generative potential of structure and agency as a duality is the problematic surrounding access block in emergency departments (EDs). Timely response to the acutely ill and injured is the *raison d'être* of an ED. However, this capability is chronically challenged by limited access to system resources. Thus, ED resources are often unavailable to incoming patients because previously admitted patients are "boarding" in the ED. The only available space is often a hallway or waiting room (Scheuermeyer *et al.*, 2010).

Although the provision of ED care in waiting areas is controversial (Wears & Cook, 2010), the alternative is potentially worse. In one ED, the emergency physicians changed their practice to mitigate risk for unseen patients by attending to waiting patients wherever they were, to assess, triage, and initiate treatment. However, because waiting areas were not monitored, the emergency nurses felt uncomfortable administering medication in a way that did not meet their practice or negotiated standards.

Here, in the liminal space of a waiting room, the political dimension of 'safety' played out. Nurses perceived the risk of patient harm as an act of commission — administering a medication without adequate monitoring, while physicians perceived the potential of patient harm as an omission — not attending to an unstable patient in a timely way. Both groups attempted to mitigate risk within the constraints of their respective structures (rules and resources). Hence, their *bricolage* was different. While

physicians had more power to innovate, nurses exerted power through resistance. Following a cluster of waiting room deaths, an urgent dialogue produced a collective change in process and led to the development of rapid assessment zones, a diagnostic treatment unit, and an organizational overcapacity protocol (Hunte, 2010). These novel structures allow for more timely assessments and interventions, a greater margin of manoeuvre, and improvement in patient flow through the ED.

3 DISCUSSION

3.1 Relation to Resilience

While structuration has found acceptance, it has not been linked to resilience — the ability of a system to handle unanticipated disruptions and variations that fall outside its integral adaptive mechanisms or models (Hollnagel, Woods, & Levenson, 2006). Moreover, structuration theory is absent from the literature that describes the complex and uncertain work environment of emergency medicine as a resilient system (Wears, Perry, Anders, & Woods, 2008), save for a single exception (Hunte, 2010).

The concept of structuration, a theory of recursive production and reproduction of social practice, expresses the mutual interdependence of structure and agency in both constraining and generative senses. Agents are empowered by structures, both by the knowledge that enables them to mobilize resources, and by the access to resources that enables them to act. Structure is therefore dynamic, not static; it is the medium and outcome of the reproduction of practice, the continually evolving outcome and matrix of interaction (Sewell 1992), manifest in material time-space rules, resources, and memory traces that orient action. Practices, not roles, constitute the mediating moment of reproduction and change in the recursive articulation between actors and structure.

Changes in formal and informal structures have (un)intended consequences for work routines (practice), the capacity to act (agency), and the meaning of work. Work systems cannot match their environments completely; there are always gaps in fitness and a need to adapt. Any system (ecological, economic, engineering) that remains viable over time must be able to cope with unexpected change. It must be able to revise and replace policies and procedures (structure), for variation not only contributes to progress, but also to stability (sustainability) in a changing environment. Although bureaucratic structures are often coercive and inflexible (brittle), they also enable work performance when they provide guidance and clarify responsibilities without squashing innovation and creativity.

The *bricoleur* works (or plays) within the possibilities (margin of manoeuvre) of a finite system, always negotiating trade-offs between structure and performance. The science of the *bricoleur* is a 'science of the concrete' (Lévi-Strauss, 1962, translated 1966), obliged to work within the elements at hand, and to cope with the inherent resistances and constraints in *travaillant de bric et de broc* (ragtag work). The set of constraints and

resources channels the set of possible innovative and evolutionary paths. Therefore, resilient organizations appreciate local practice variations as a potential trove of unique innovations and commit resources to their development in order to support and enable adaptive action.

Whereas variable practice is instrumental in maintaining stability amidst perturbations, stable mechanisms and limits enable adaptability by providing the background and memory for identifying the unexpected. Effective bureaucracy facilitates the transfer of scarce attention and resources from routine to non-routine tasks by fostering trust, reducing uncertainty, and providing a framework for emergent action (Farjoun, 2010). A systemic and collective approach facilitates adaptation by promoting coordination, channelling work in productive directions, and guiding and promoting innovation. The duality perspective of practice theories therefore offers insight into how exploitation and exploration intertwine in the messy world of practice (Powell, 1996). The duality perspective of practice theories therefore offers insight into how exploitation and exploration intertwine in the messy world of practice (Powell 1996). It reflects a tension that can never be resolved, but must be actively managed (Greenhalgh, Potts, Wong, Bark & Swinglehurst, 2009).

4 LIMITATIONS

Structuration leaves room to consider practices as activities of individuals guided by rules, and only reaches its potential as an innovative view of social action when the locus of analysis moves from individuals to practices.

5 CONCLUSION

To think about "tradeoffs" from a structuration or recursive practice perspective helps us move beyond the problematic dualism of structure and agency and guides our understanding of interdependencies and margins of manoeuvre. Moreover, a recursive lens illuminates new approaches to designing resilient systems that are capable of coping with complexity in everyday practice.

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