Social Structure in Naturalistic Decision Making

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ABSTRACT

Motivation - While much of the early NDM research emphasized technical proficiency, more recently, NDM research has begun to investigate cognition in social contexts. As a result, we argue that NDM research can benefit from stronger theoretical linkages with social theories and the concept of social structure, which has arguably been the central concept in sociological investigation. **Research approach** - This is a theoretical paper. **Originality/Value** - We build theory of how institutional, relational and embodied concepts of social structure can be used to as an analytical lens to provide rich descriptions of NDM type socio-cognitive interaction. **Take away message** - Ontological clarity regarding the relationship between NDM and social structure allows NDM research to better position itself in relation to objectivist and subjectivist stereotypes and to utilize various structuration theories to address socio-cognitive interaction. This contributes to our understanding of interactions between NDM type cognitive powers, and institutional and relational structures.

Keywords

Social structure, embodied / relational / institutional structure, socio-cognitive interaction

INTRODUCTION

Naturalistic Decision Making (NDM) related cognitive research has made significant contributions to explaining how proficient decision-makers handle dynamic and changing contexts and related Man-Machine systems (e.g. Klein et al. 1993; Klein 1999; Lipshitz et al. 2001; Salas and Klein 2001; Zsombok and Klein 1997). While much of the early NDM research emphasized areas of technical proficiency, more recently NDM research has begun to investigate cognition in social contexts (e.g. Gore et al. 2006; Lipshitz et al. 2006; Roth et al. 2006; Shattuck and Miller 2006). As a result, we argue that NDM related research can benefit from stronger theoretical links with social theory and the concept of social structure, which has arguably been the central concept in sociological investigation. In particular, we build theory addressing how institutional, relational and embodied concepts of social structure can be used to as an analytical lens to provide rich descriptions of NDM type socio-cognitive interaction. This allows NDM research to better position itself in relation to objectivist and subjectivist stereotypes, utilize various structuration theories to address socio-cognitive interaction, and to analytically examine dynamic interaction between institutional and relational structures and cognitive causal powers.

While this paper emphasizes the importance of social structures, at the same time, we recognize that social structure is a controversial idea even in social research. Interestingly, social research and cognitive research have been both challenged by similar atomistic arguments, where the mind and social structure have been seen as epiphenomena. The question is if we can better explain the properties of the mind using lower level material causal mechanisms, and if social structures can be better explained by investigating the properties individuals. As Sawyer (2002: 233) has pointed out, this parallel between the social and cognitive research was already recognized by Durkheim in 1898:

“Each mental condition is, as regards the neural cells, in the same condition of relative independence as social phenomena are in relation to individual people.... Those, then, who accuse us of leaving social life in the air because we refuse to reduce it to the individual mind have not, perhaps, recognized all the consequences of their objection. If it were justified it would apply just as well to the relations between mind and brain” (Durkheim [1898] 1953: 28)

As another parallel, both social and cognitive research traditions have tried to counter the reductionist argument with the idea of synchronic emergence, where the collective whole is seen as more than the sum of its parts. More specifically, an “emergent effect is not additive, not predictable from knowledge of its components, and not decomposable into those components” (Sawyer 2001: 553).

“We all know that a system can be described as a whole or as a collection of its parts, and generally agree that with the maxim that the whole is more than the sum of its parts. Yet as soon as we turn from the world of

words to the world of things, we act as if the whole was merely a collection of independent parts.” (Hollnagel and Woods 1999: 342)

While there are philosophical means to support the idea of synchronic emergence, it is easier to justify the study of emergent properties purely based on methodological grounds. Even if the causal mechanisms of the whole were already present in the causal mechanisms of the parts, this does not logically entail that the study of atomistic parts is the most appropriate level of analysis (Sawyer 2001). Thus, emergent properties of “the social” can provide an appropriate analytical lens, even if it becomes later on possible to explain emergent properties of social structures with the properties of individuals. As a parallel example, in NDM research, this type of methodological approach was used to develop the RPD-model:

“After considerable research on recognition primed decision making, we realized that the model was basically a combination of three decision heuristics that had already been well-studied from the microcognition perspective: availability and representativeness to identify the typical course of action, and the simulation heuristic to evaluate the course of action (Kahneman and Tversky 1982). Therefore, in this case it was possible to trace the macrocognitive phenomenon back to hypothetical microcognitive components. However, several decades of research on the availability, representativeness, and simulation heuristics had not led to a discovery of recognition decision making.” (Klein et al. 2003: 82)

Accordingly, there can be distinctive methodological advantages to treat social structures as if they were “real” in NDM type socio-cognitive research. To quote Sawyer (2001): “if we can identify that a phenomenon has causal power, then we must treat it as real.”

SOCIAL STRUCTURE

As a description of social structure we adopt Lopez and Scott’s (2000) theoretical framework, which tries to synthesize over 100 years of debate surrounding the concept of social structure. Lopez and Scott (ibid) describe social structure as having three manifestations, namely institutional structures, relational structures and embodied structures. Firstly, institutional structures concern “normative or institutional phenomena: individuals act in terms of normative expectations which thereby, structure their actions” (Scott 2001: 78). The importance institutional structures has been acknowledged in the definition of NDM, as “organizational norms and goals” is one of its eight defining characteristics (Orasanu and Connolly 1995: 7). Secondly, “relational structure” refers to the social relations themselves, “understood as patterns of causal interconnections and interdependence among agents and their actions, as well as the positions that they occupy.” (Lopez and Scott 2000: 3). Relational structures between social agents are seen to change the atomistic properties of social agents. For example, slave-master relationship, teacher-student relationship, and landlord-tenant relationship all change what the effected people can do. Relational structures together with institutional structures are thus part of the real life contexts of NDM type decision-making, which social agents navigate in everyday socio-cognitive interaction. Thirdly, the concept of embodied structure refers to cognitive structures, which embody tacit social habits, norms, skills and other social predispositions (Bourdieu 1990; Giddens 1979). The concept of embodied social structures thus provides a straightforward linkage between social theory and NDM type cognitive theory.

OBJECTIVISM AND SUBJECTIVISM

To take social structure into consideration in NDM research, social agents’ cognitive powers need to be appropriately positioned in relation to social structures and their causal powers. This positioning needs to avoid the extremes of objectivist and subjectivist stereotypes. The stereotype of objectivism portrays human beings lacking agency to influence their social destiny because of the powers of social structures (e.g. Parker 2000). This extreme theoretical position would render individuals, and their NDM-related cognitive powers unable to influence the direction of social processes.

According to the stereotype of subjectivism, individuals are seen as unconstrained by social structures (ibid). This stereotype thus describes individuals as masters of their own social destiny, effectively exaggerating the significance of cognitive causal powers in social interaction. To navigate between these extremes in an informed way, NDM research can utilize various “structuration theories” (e.g. Archer 1995; Bhaskar 1979; Bourdieu 1990; Giddens 1979), which carefully reconcile the subjectivist and objectivist positions without reifying social structures. Structuration theories have thus tried to find a way of explaining how social structures can constrain and enable people, and their cognitive powers, while at the same time acknowledging that social structures can only exist because of the activity of people. Without people there are no social structures, and yet individuals cannot freely change social structures.

For NDM research, an easy entry point to structuration theory can be found in Bourdieu’s and Giddens’ structuration theories. This is because both Bourdieu (1977, 1990) and Giddens (1979) rely extensively on the embodied structure concept. Bourdieu’s theory of “habitus” describes how early social experiences become an embodied as part of who we are, manifested in our social practices, for example, in the way we speak, eat, walk, and interact with others (Bourdieu 1977, 1990). Similarly, according to Giddens’ Structuration Theory (Giddens 1979), social structure is seen to only

exist in our embodied cognitive structures. Drawing an analogy between language and speech, Giddens describes the embodied social structure to have language like virtual existence outside time-space. It is only in social practices that this virtual existence of social structure becomes enacted, similarly to language being enacted in speech. Naturally, institutional and relational structures dependent on embodied social structures (Lopez and Scott 2000). Yet, this does not necessarily make institutional and relational social structures less real or methodologically less significant.

As an example, Archer's (1988, 1995) structuration theory has significant methodological advantages. Archer bases her theorizing on critical realist philosophy of science (Archer et al. 1998; Bhaskar 1975, 1979; Sayer 1999) where social relational and institutional structures (or "culture") are seen as "real" entities. This allows an analytical separation between structure and agency to better investigate their interaction. By applying Archer's structuration theory to NDM research, this separation allows us to analyse of the interplay between social structure and cognitive powers in three analytically separate stages. At T1, social structure begins to condition NDM, resulting in a cognitive adaptation to social complexity (see Figure 1). For example, we were born into a particular society and social class which both pre-existed us, and conditioned our cognitive presuppositions before we had a chance to influence back at social structures. It is only at T2-T3 that socio-cognitive interaction takes place, which allows our cognitive powers to influence social structure (see Figure 1). In the end of the cycle, institutional, relational, and embodied structures are reproduced or elaborated as a result of socio-cognitive interaction. At this point in time, these social structures have already begun to condition the next cycle of social interaction.

Figure1. Social NDM applied from Archer (1995: 157)

Some aspects of this three-part analytical conceptualization are already featured in NDM theory. For example, in NDM research has adopted an extended the idea of "decision making" beyond mere "decision-events".

"...decisions are embedded in larger tasks that the decision maker is trying to accomplish... that consist of defining what the problem is, understanding what a reasonable solution would look like, taking action to reach that goal, and evaluating the effects of that action." (Orasanu and Connolly 1995: 6)

For example, macrocognition has been described as a cognitive adaptation to environmental complexity (e.g. Klein et al. 2003). Also, Cognitive System Engineering can be seen as an attempt to generate appropriate structural conditioning that matches cognitive requirements. Social NDM however has an even broader analytical span, as decision-making begins by society first shaping the "habitus" of social agents, as a part of structural conditioning (see Figure 1.) This conditions agents to have an embodied feel for the social games being played in a particular social "field" (Bourdieu 1977, 1990). This influences how social agents define problems, evaluate reasonable solutions, take action, and evaluate the effects of that action. In addition, NDM type decision-making has structural consequences as NDM reproduces and elaborates social structures (T3-T4), including our embodied presuppositions and related skills. Analytically speaking, social NDM thus begins before agents begin to evaluate the nature of problems, and continues after socio-cognitive interaction is finished (see Figure 1). This means that social NDM extends the analytically relevant domain NDM in both temporal directions.

IMPLICATIONS

Our proposed social-turn in NDM research proposes to use social structures as a methodologically lens to provide richer descriptions of NDM in real life social contexts. If this argument is accepted then NDM-related research needs to

carefully position itself in relation to objectivist and subjectivist stereotypes. Accordingly, entirely subjectivist (or objectivist) socio-cognitive explanations can not be seen as satisfactory theoretical explanations of social NDM. This has significant implications to example Cognitive System Engineering in social contexts, as we cannot assume that relational, institutional and embodied structures follow ideal system designs. Instead, elaboration of socio-cognitive systems can be described using structuration theories, which carefully theorize agents' bounded powers to influence social systems. Accordingly, social ordering is likely to be a continuous activity striving to maintain / achieve social order. Recognizing the nature of social structures thus provides an additional clarification regarding the realm of the possible. This is largely a matter of acknowledging the unavoidable presence of unintended consequences (Weber 1947), contradictions, and other unavoidable tensions within social systems.

“Society is that which nobody wants, in the form in which they encounter it, for it is an unintended consequence. Its constitution could be expressed as a riddle: what is it that depends on human intentionality but never conforms to their intentions? What is it that relies upon people's concepts but which they never fully know? What is it that depends upon action but never corresponds to the actions of even the most powerful? What is it that has no form without us, yet which forms us as we seek its transformation. And what is it that never satisfies the precise design of anyone yet because of this always motivates its attempted reconstitution?” (Archer 1995: 165)

In addition, value-rationality (or *phronesis*) has received relatively little attention in NDM research, which the inclusion of the social dimension problematizes. As a result it becomes increasingly difficult to use purely cognitive arguments to determine how a socio-cognitive system should look like. At the same time, NDM research can contribute to theoretical explanations of how social agents make value-rational judgments in real-life social contexts, and how this results in the reproduction / elaboration of social structures. This objective can be facilitated by expanding the analytical domain relevant to NDM, as we have proposed in Figure 1. Value-rationality is indeed part of NDM as “organizational norms and goals” are included in the definition of NDM (Orasanu and Connolly 1995: 7).

Thirdly, we argue that it is significant to find a better theoretical accommodation between NDM type decision-making and organizational bureaucracies. In particular, it is important to recognize that while bureaucracies have various well documented shortcomings, NDM type decision-making cannot entirely eliminate bureaucratic forms of social ordering. In addition, despite its shortcomings it is not always desirable to replace bureaucratic rigidities with NDM type decision-making. For example, in “In Praise of Bureaucracy” Paul du Gay (2000) describes bureaucracy as having the benefit of encouraging systemic fairness. In some situations, we can indeed improve systemic fairness through bureaucratic means. Naturally, the reverse can as well be true. There are numerous examples of organizational failure because of both too relaxed, or too stringent bureaucratic controls. As a result, we need to better understand the interaction between bureaucracies and NDM type decision-making, as social ordering often depends on a delicate balance and interaction between these two seemingly contradictory positions. This question can be partly addressed by examining the analytically distinctive stages of structural conditioning, socio-cognitive interaction, and structural elaboration (see Figure 1.)

Lastly, we argue that the social-turn in NDM requires a new kind of vocabulary and linguistic sensitivity that takes into consideration the various dualisms, indeterminacies, unintended consequences, value rationalities, politics, and power considerations of socio-cognitive interaction. In particular, it is important to avoid language that inadvertently describes the social context as a “hydraulic system”, designed and controlled by powerful puppet masters.

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