

Understanding Douglass North in Game-Theoretic Language¹

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I

When the Editor of this Journal invited me to participate in the Symposium on North's recent work, *Understanding the Process of Economic Change (2005)*, I attempted to re-read it carefully so that I would be able to say some value-added and, if possible, even challenging remarks. But I must confess that I have found this extremely difficult. The book is not only well-written, as is usual for North, but its dynamic perspective is original, yet persuasive and comprehensive. Some of my uncertain feelings regarding his previous book, *Institutions, Institutional Change and Economic Performance (2000)*, are subtly and imaginatively cleared within this new book. I see a noticeable development between the two books.

The previous book laid the foundation for New Institutional Economics by conceptualizing institutions as the rules of the game, pointing out the vital importance of effective enforcement and arguing for the crucial roles they play in determining economic performance. Thus it became a seminal book. But if the rules of the game are so crucial, then why doesn't a lagging economy emulate the rules that prevail in more advanced economies? Why cannot the rules of the game be changed and enforced by emulation? It seemed that in his previous book North regarded it the essential role of polity to change and enforce the (formal) rules of the (economic) game. But in his view, political markets are imperfect and inefficient so that better rules cannot be emulated/devised or enforced as desired. Thus a further question is raised regarding how rules of political games are determined. This problem of potential infinite regression needs to be answered by going back in historical time to the past. Thus history matters to our understanding of institutions and thus the performance of an economy.

In his previous book North exhibited potentially fruitful insights into the process of institutional change. However, in the present book, particularly in Part I, he has made critical progress toward

¹ This is a contribution to the Symposium on D.C. North's volume 'Understanding the Process of Economic Change' in *Structural Change and Economic Dynamics* (Elsevier).

understanding to the nature of this process. He is now more explicit and vocal about the evolutionary nature of institutional change. By this I do not mean that he draws a simple analogy from biological evolution by relying on such notions as mutations, re-combinations, etc. He innovatively focuses on the evolution of belief systems that human agents hold, arguing that we perceive the 'human landscape', interpret it, discover problems within it and intend to solve them. In this way, we collectively and incrementally change the societal rules of the game. In other words, we may say that there is a co-evolution of belief systems and institutions. He neatly summarizes this relationship as follows:

There is an intimate relationship between belief systems and the institutional framework. Belief systems embody the internal representation of the human landscape. Institutions are structure that humans impose on that landscape in order to produce the desired outcome. Belief systems therefore are the internal representation and institutions the external manifestation of that representation. (2005: pp.49-50)

From this fundamental premise, North derives the following inter-related questions, among others, and provides well considered answers: (1) How does the belief-institution co-evolution mechanism work? (2) How do genetic, cultural, theoretical, and empirical factors interact in forming belief systems? (3) What role do individuals play in institutional change? (4) How are social, political, economic, and cognitive factors interrelated in the institutionalization process? These questions have never been faced squarely and systematically by any economists before North, other than by Hayek to whom he frequently refers. Below I will discuss the theoretical answers North provides, and thus focus on Part I of his 2005 book.

As for the first question regarding the nature of the co-evolution mechanism, North schematically offers hints in the following paragraph, using the rise and fall of the former Soviet Union as an example:

“This story of the Soviet Union is a story of perceived reality →beliefs→institutions→policies→altered perceived reality and so on. The keys to the story are the ways beliefs are altered by feedback from changed perceived reality as a consequence of the policies enacted, the adaptive efficiency of the institutional matrix – how responsive it is to alteration when outcomes deviate from intentions – and the limitations of changes in the formal rules as correctives to perceived failures.”(2005:p.4. See also Chapter 11)

I will discuss the nature of these circular relationships later. As for the second issue of how beliefs are formed, the evolutionary psychologists' view that human modular cognitive structure were essentially formed and fixed in the era of hunter/gatherers is one North rejects as too simplistic. Particular “local” experiences of individuals as well as the non-local experiences of a community enter as inputs into the learning process. He allows that learning is individually unique, but also notes the

importance of culture that collectively accumulates partial solutions to frequently encountered problems of the past and works as filter for processing and interpreting the emergent information. Thus genetic factors, cultural heritage and experience may all matter.² As for the third issue, he argues throughout the book that the dominant beliefs held by political and economic entrepreneurs in policy-making positions play important roles in determining the direction of institutional change. But as culture also plays an important role in filtering information, the broadly held belief system within the society reflects the nature of collective characteristics. As for question (4), he fundamentally ascribes to the view he expressed in his 1990 book: "it is the polity that defines and enforces the formal economic rules of the game."(2005:p.57) He argues that "formal institutions can be changed by fiat, informal institutions evolve in ways that are still too far from completely understood."(p.50)

I am in an agreement with his basic stance regarding issues (1) and (2) and learned a lot from his arguments to reinforce my understanding of the issues. This is particularly true of his preference for the connectionist perspective over the symbolic-exchange approach as an explanation of cognitive process, which seems to be consonant with recent developments of linguistic theory and appears promising for understanding the cultural aspects of learning. From this perspective, it is natural to draw the conclusion that a belief-institution co-evolution process is gradual, constrained by historical path (path dependent) and diverse across time and place.

However, I tend to feel a modicum of tensions between his stance on issue (2), on the one hand, and his position on (3), and thus on (4), on the other. North, who argues (quite rightly to me) for the critical role of collective belief "systems" in institutionalization, appears to place more weight on the individualistic roles of political and economic entrepreneurs (which is difficult for anyone to deny). Of course these may not necessarily be contradictory or inconsistent positions. There can be collectively shared belief systems in which the individual roles of entrepreneurs are considered important (as in the US). However, he conceives of "societal beliefs" or "belief systems", which have a critical impact on institutional frameworks, as an aggregate of individual beliefs ("minds"). He argues that: "When conflicting beliefs exist, the institutions will reflect the beliefs of those who are (past as well as present) in a position to affect their choices."(2005: p.50) This raises a host of question in my mind: Can a belief system be viable without common elements? Does the culture-conditioned learning of non-entrepreneurial people not play any role?

² For a useful survey of recent studies of gene-culture co-evolution, see Gintis (2007)

One solution to these questions would be to regard the word belief as one with subtly differentiable connotations. One use of the word, which seems to be the one primarily employed by North in connection with discussions of the issue (2), could be in the sense of “expectations about others’ behavior” as in the theory of game. For example I “believe” that farmers and merchants sell organic food and crafts every Sunday on California Avenue in Palo Alto. This belief can be confirmed by visiting the street every Sunday. I can share it with my friends who trust what I would say about such kinds of things. It can be shared with my neighbors as well, who do not know me personally but read the same local newspaper I do. This type of belief may be considered as essentially corresponding to what North refers to as a “perception about human landscape”. And, this is the one I consider/claim (not “believe” in the current sense) to be appropriate for a discussion of belief-institution correspondence. In fact I conceptualized institutions as “shared beliefs about the salient ways in which the game is repeatedly played.”(Aoki 2001:p.26, 2007) They are common knowledge about the state of play. However, this claim of mine cannot necessarily be shared even with those people who share a cultural heritage and local experience with me, although I would personally wish it were the case. Yet I can say that I “believe” that this conceptualization is appropriate for understanding the essential nature of institutions. The word used in this way relates to something which one holds as a credo, faith, position, opinion, and the like, which cannot be empirically proved and potentially acceptable to everyone. When North says that dominantly held beliefs in the society compose the societal beliefs, he may be referring to this meaning of the word. I totally agree that that the “positive/ideological beliefs” of political entrepreneurs, as well as the “predictive/intuitive beliefs” of economic entrepreneurs, can be a driving force of institutional change as such beliefs make a certain direction of change in the human landscape a “focal orientation”. But it is one thing to say this and another to understand how such beliefs become shared beliefs and thus institutions. I will discuss below how this subtle difference can be clarified using game-theoretic language.

There is another, albeit related, semantic question. In the 2005 book, the concept ‘intentionality’ plays an important role in explaining the transition from beliefs (or perceptions) to effect new institutions (there are eight entries in the index). I was unable to be sure whether North used the word in the sense of its ordinary meaning of “intention” or “aim”, or in the sense used by philosophers, i.e., in the sense of “the directness or aboutness of mental states” (he refers to/quotes the philosopher Searle, who wrote a book on the subject, twice in connection with the word). If he is using the word in the former sense, which appears to be the case from casual reading, individual entrepreneurs resemble

agents with fewer collective constraints because of their determined intentions (see for example p.51 where he departs from Hayek). In the latter case, however, intentionality can mean something equivalent to “mental representation”.³ Then from (2) above, even entrepreneurs can be constrained by cultural heritage and the existing institutional framework. This tension is remindful of the difference between the economic approach, based on methodological individualism, and the sociological approach, that focuses more on (interactive) collective constructs. However, North is opposed to such disciplinary divisions.

This human environment is divided by social scientists into discreet disciplines – economics, political science, sociology – but the constructions of the human mind that we require to make sense out of the human environment do not coincide with these artificial categories. Our analytical frameworks must integrate insights derived from these artificially separate disciplines if we are to understand the process of change. Moreover we must understand what is the underlying force driving the constructs that the mind makes. (2005: p.11)

How successful he is in his attempt to integrate these disciplines toward understanding the belief-institution co-evolution process will be assessed by different readers in different ways. However, I am sure that there will be agreement among careful readers that he has made significant contributions in this respect and opened up a potentially fruitful framework for furthering social scientific studies in this direction. In the following two sections I would like to attempt to re-phrase and re-interpret what he has said, using game-theoretic language beyond casual analogy. Surprisingly it suggests a way to reconcile the above-mentioned tension between the roles of individual and collective constructs. Also it suggests an analytical framework for understanding dynamic interactions between economic, social, political and cognitive factors in the process of belief-institution co-evolution.

II.

North’s famous opening definition of institutions in his 1990 book was “the rules of the game in a society”. The rules are either formal (constitutions, regulations, fiats, etc.) or informal (customs, conventions, norms). Whichever is the case, he seems to take rules as given, either by political design or as a result of the accumulated experiences of past generations.

³ In fact the concept intentionality is a controversial one among philosophers and Searle’s position (1983) is not necessarily accepted. Consult “Consciousness and Intentionality” by C. Siewart in *Stanford Encyclopedia of Philosophy*, <http://plato.stanford.edu/entries/consciousness-intentionality/>.

Rules may be considered as composed of three factors: who the players are; which player can do/cannot do what; and what scores accrue to whom through which combination of plays. In fact, analogies of social interactions with the game, as well as those of social orders with the rules of the game, have been drawn by authors of various orientations prior to North (e.g., Adam Smith, 1759/1976: p.234; Huizinga, 1938/1950; Rawls, 1955:pp.1,26; Braudel,1958/1980:pp.42-43; Bourdieu,1985, 1992 with Wacquant:pp.98-100; Hayek, 1976:pp.115-25, 1988:p.154). The uniqueness of North's analogy is the particular attention paid to the importance of enforcing rules. Even if the rules are known and given, they may not be followed by players who want to score higher points. He thus reminds us that the ways in which the rules are enforced constitute another important pillar of institutional arrangements. We may entrust the task of enforcement to the dictates of individual players' consciences as well as peer monitoring among players. But we need a third party referee (the state) to enforce the rules when the game grows larger and more complex. This perspective opens up an integrated approach to economic and political markets as determinants of economic performance that is marvelously pursued in the 2005 book (particularly in Par II).

To engage in further communication with North, I want to focus on the beliefs of the players, another generic, endogenous feature of the game. Even if the formal rules are given, the players have to form conjectures about the ways in which other players play in order to choose their own strategy for scoring high points (whichever counts). This is a common feature of the societal game, whether it is economic, political or social, making it distinct from the natural phenomena interactions of inorganic substances. Obviously, players cannot, and need not, form detailed beliefs (in the sense of conjectures) about other players' behaviors (strategies). Each of them forms his/her own beliefs to the extent possible within his/her information processing capacity and relevance to his/her strategic choices (relevancy may be conditioned by his/her experiences, preferences, genetic traits, etc.). Knowledge-theorists conceptualize what each player believes (knows) about the other players' strategic choices by the so-called information set of all the players' possible strategic choices.⁴ It is the subset of the space which includes the true state of play as well as all other states of play that the player cannot or does not distinguish from the true state (it is assumed that every player knows his/her choices and that (s)he does not make mistakes, although his/her conjectures are rough). This represents the player's

⁴ See Fagin *et al* (1996): chapter 2 and Osborne and Rubinstein (1994); Chapter 5.

knowledge of how the game is being played together, which may be roughly identified with what I conceptualized as the “subjective game model” in my work (Aoki 2007: Chapter 9). If this information set is finer (resp. coarser) in the sense that it is smaller (resp. larger), but includes the true state of play, then this implies that he knows better (less). Further, knowledge-theorists define common knowledge/shared beliefs as the finest set among those sets which are coarser than, or equivalent to, the information set of any player. Roughly speaking, it represents the knowledge or belief that even the least informed player knows.⁵ It represents a common feature of subjective game models across all players. It can be interpreted as the “societal belief” shared by all regarding the ways the game is played together. If each player plays the best given his/her own information set, then their shared belief is by definition correlated equilibrium (when I say “the best”, it is not necessarily assumed that the players act exclusively in a self-regarding manner. I will return to this later).

North begins the 2005 book *What If?* with a chapter on the non-Ergodic nature of the human world, thus it may seem out of place to define societal beliefs in terms of equilibrium. However, permit me to do so, as North himself notes that “the easiest way to think of [the issue of institutional change] is in an equilibrium context.” (1990; p.86) There are two important questions to ask regarding the nature of the above equilibrium. The first is to understand the relationship between the formal rules of the game prior to the actual play and the shared beliefs that are endogenously generated as equilibrium through actual play. What if inconsistency arises between them? First of all, note that there is no guarantee that there will always be a one-to-one correspondence between formal rules and shared beliefs. There can be multiple equilibrium societal beliefs for given rules. One may interpret this to mean that the rules are given historically, but different ways of playing the game can ensue. Suppose that a particular equilibrium prevails and it is consistent with the formal rules of the game in the sense that the latter are not violated. This is the case in which the formal rules are self-enforcing and correspond to what Adam Smith described when the legislators’ intentions and peoples’ motivations coincide. He argues that if this is the case, “the game of human society will go on easily and harmoniously, and is likely to be happy and successful” (1976:p.234). But when the two are inconsistent, the formal rules are in fact being ignored, violated or they are irrelevant. Which ought to be considered as the institution in this situation? This may be nothing more than a semantic question, but I would identify the endogenous shared belief as the institution rather than irrelevant rules. The former represents the social order in the sense of actual game play, which in turn reproduces and sustains peoples’ individual beliefs in a correlated

⁵ See references in 3) and Aumann (1987), Milgrom (1981).

manner. If any player attempts to ignore it, it will not be beneficial; following it will save the player's information processing effort to (even partially) achieve his/her objectives. It is objectively real and it is subjectively held by all the players. This circular, dualistic relationship seems to be consonant with North's quoted dictum above: "Belief systems are the internal representation and institutions the external manifestation of that representation." If formal rules are violated or ignored, they may be regarded as outcomes of bad policies but not as an institution which guides and constrains peoples' behavior. This suggests that a polity-determinant theory of institutions needs to be taken carefully

So far it has been assumed that shared beliefs, as formally defined above, exist. But the second fundamental question is, under what conditions do they exist? In my view an exploration of this question is a crucial prerequisite to understanding the nature of the institution-belief co-evolution. Above we considered a very special case in which every player possess a definite information set, i.e., a case in which there was no uncertainty about players' beliefs/knowledge regarding the actual state of play although the player's information processing was incomplete. Now let us introduce the players' uncertainty of beliefs. Suppose that each player forms a probability distribution over his/her own information sets which altogether form a complete partition of the entire space of possible states of play of the game (we still remain in a fictitious Ergodic world). The players' ways of partitioning the space of possible states of play can be diverse, depending on their information processing capacities, experience, interests and so on, although they are overlapped to a certain degree. There can be also large subsets to which players ascribe zero probability because of their bounded rationality, ignorance, indifference, etc. (a crude way of explaining the non-Ergodicity of the world). Analogously as before, we can theoretically derive a common partition of the space of possible states of play in such a way that every player will know the happening of a certain event (as defined as a set of some states of play), when any state of play included in the event actually happens and that each player knows that the other players know it. Suppose that every player knows his own preference ordering and probability distribution over possible events and that they are commonly known to each other.⁶ Note that we are not assuming that each possible state of play can be known with identical/different probabilities, only a modicum of commonality in players' capacities to differentiate events with possibly different probabilities.

Aumann and Brandenburger (1995) presented a result in this setting that may have a significant implication on our interest. They showed that if there is a common prior regarding possible types for

⁶ This knowledge can be identified with the "subjective game model" in the case of uncertainty.

each player (as a basic premise of uncertainty) and their conjectures about other players are common knowledge, then all the players will agree on the same probability assessment over common partitions of the space of possible play and it will be a Nash equilibrium (which is a more restrictive notion than correlated equilibrium as mentioned before). This may not be too surprising. If they agree beforehand on each other's basic traits, it would be difficult to disagree over conjectures about mutual behaviors ex post relative to their common partition. However, they suggest a more striking possibility. The assumption of a common prior is not only sufficient, but the assumption can be very tight in the sense that without it the existence of Nash equilibrium of belief system may be rendered impossible.

Their theory concerns the generic level and must be used with great care to derive any concrete implication regarding institutions as stable common knowledge. However, it suggests that an institution conceptualized as an epistemic equilibrium with the same beliefs among the players relative to their common partition may be impossible if we assume that there is no common prior about other's characteristics (preferences, possible actions, beliefs regarding others), however rough they may be.

This is a serious challenge to the methodological individualism which regards that social constructs are made possible by individuals whose preferences and beliefs are independently fixed prior to mutual interactions. North refutes such view by saying that "[t]he institutional structure reflects the accumulated beliefs of the society over time, and change in the institutional framework is usually an incremental process reflecting the constraints that the past imposes on the present and the future."(2005:49) He further quotes the cognitive scientist Edwin Hutchens who says: "culture, context, and history ... are fundamental aspects of human cognition and cannot be comfortably integrated into a perspective that privileges abstract properties of isolated individual minds."(1995: 354) Pursuing the implication further, Hutchens argue that "human cognition is not just influenced by culture and society, but ... it is in a very fundamental sense a cultural and social process."(ibid: xiv) Thus the frontiers of social and cognitive sciences together seem to be making an important departure from methodological individualism and North is certainly making his mark there.

III.

If something common is transmitted internally as well as externally to individuals in a societal evolutionary process, it must be through actual play of the societal game. What are the mechanisms involved in the process? North rightly urges us to explore them by saying that "[t]he enhanced specification of how individual beliefs interrelate with social context provides a set of mechanisms by

which culture and social institutions enter more directly into explanations of economic change.”(2005:p.36) To proceed in this direction, we need to explore dynamic relationships between individual beliefs (subjective game models) and societal order (institutions), as well as among various social, political and economic processes. As I have already touched on the former kinds of interactions in generic terms, let me focus on the latter kinds of interactions below.

North argues that “[w]hile formal institutions can be changed by fiat, informal institutions evolve in ways that are still far from completely understood and therefore are not typically amenable to deliberate human manipulation.”(2005: p.50) However, it is intuitively clear that informal rules, such as social norms, do not stand alone but interact with the ways in which other games, both political and economic, are played. These possibilities have been explored, for example, in terms of the celebrated “social embeddedness” by the economic sociologist Mark Granovetter. This concept is amenable to the game-theoretic analysis of “linked games.” To use a simple example, even if it is technologically difficult to punish a player who defaulted on an informal economic contract, if a general expectation holds that this player can be ostracized from community social exchange, informal contracts may become enforceable. (Aoki; 2001, chapter s 2.1, 8.1; 2007) Social norms tend to be inertial so that they can deter people from exploring new ways of playing economic games (2005: p.58). But somewhat counter-intuitively, there seem to be also cases in which norms facilitate the members of a community to explore new ways as well. For example, when a closed rural community faced an opportunity to trade with outside merchants, the presence of a solid social norm among community members (the expectation to punish deviants) can work as a contract enforcing mechanism in bilateral ways, i.e., punishing defaulting outsiders as well as defaulting inside members(Aoki, 2001: chapter 10.1; Aoki and Hayami 2002).

As already noted, North emphasizes a flow of impacts from the political game to the economic game in terms of formal rule-making. However, as he also takes into account, the ways the economic game is played may influence not only policy decisions (moves in the political game), but also the ways the political game is played together, i.e., a political institution itself. For example, the rise and fall of particular economic interest groups may change the coalitional structure between the government (politicians) and private agents (economic organizations, tax-payers cum voters, etc.). Then, in order to understand the process of institutional change, bilateral relationships between the ways strategic play of the political and economic games are coordinated by people and organizations need to be explored. These relationships may be amenable to explicit game-theoretic analysis in terms of dynamic strategic

complementarities (Aoki 2001, chapters. 8.3 and 10.3). That is, changes in the players' strategic choices in one domain of the game may be facilitated by those same players (and others) in another domain (because marginal pay-offs from the former are increased by the latter) and vice versa.

From the 1990 book to the 2005 book, North takes pains to distinguish organizations from institutions. He argues that organizations are players of the game, separate from its rules. But I tend to think that the distinction is subtle. It is true that organizations, whether political, economic or social, are players of game in the relevant domains. At the same time, however, the ways in which organizations are structured (e.g., how (economic) activities are bundled together into an organization and how organizational participants are incentivized to interact with each other) may be conventionalized in the organizational field (to use the terminology of organizational sociologists), and innovated by entrepreneurs. For example, the emergence of a cluster of entrepreneurial firms, such as Silicon Valley, at the expense of the traditional, large, Chandlerian, integrated firms, is a good example of the latter. On the other hand, these kinds of clusters have had difficulties emerging in places where long-term employment commitments have been the norm.

These observations suggest that it would be fruitful to explore the interactions of plays across different domains, such as social, economic, political and organizational games. But as North points out, it is still at an unsatisfactory stage for us to formulate social and political games, if not so much economic games (and to some extent intra-organizational games as well as inter-organizational games). However, his 2005 book suggests interesting and potentially worthwhile directions of exploration, particularly regarding political games. To understand the nature of interactions of play across different domains of games, we first need to be clear about what makes one type of domain essentially distinct from another. It would not be too fruitful to impose an economic model of rational choice on other domains of games, such as the political and social. Nor would it be proper to regard certain social norms per se as "inefficient", if the objectives of people who are engaged in social exchange may not be strictly self-regarding.

Huizinga who regarded the play of the game as ubiquitous in every domain of social interactions (thus *Homo Ludens* = Human the Player), made an interesting observation. He said the words "prizes", "price" and "praise" all derive from the Latin *pretium* (1938/1944/1950: p.51).⁷ The pay-offs in political, economic and social games may be roughly thought of as respectively corresponding to these words. All

⁷ Hayek refers to Huizinga's work (1938) as "the masterly and revealing analysis of the role of play in the evolution of the culture." (1988: p.154) Huizinga regarded that "[Play] creates order, is order." (*ibid*: p.10)

are payoffs, but political prizes, such as winning votes, enjoying political support, etc., are of different in nature from economic pay-offs represented in monetary value. Political prizes are also different from social praises, which can constitute social reputation (social capital) and may be individually enjoyable but may not necessarily be obtained from self-regarding acts only. The mode of interaction among players also differs from one domain to another. An exchange of economic goods cannot be realized without mutual agreement (a contact!) between agents holding rights to respective goods, whereas social exchange involving social symbols such as words, gestures, gift giving, and so on are performed with unspecified obligations of reciprocity (Blau 1964/1998). If a party does not fulfill implicit obligations, then (s)he will lose “praise” (reputation). Through repeated accumulation of such exchanges, social norms may emerge.⁸ In the political domain, the government (the powerful) may exercise unilateral rights (power) to reallocate resources (through taxation, public expenditure, legal punishment, conscription, bribery and so on), and expects “opinions” from the people in return. People may form opinions, not necessarily from exclusively self-regarding points of view, but also from respective “public” points of view. As a result, various types of equilibrium can emerge in the political-exchange domain, depending on how stable the coalition is between the government and certain private groups or private citizens vis-à-vis possible abuse of power by the government (Hayek 1960; Weingast 1995, Aoki 2001:chapter 6). From this equilibrium perspective, it is interesting to note that the English word “state”, in the sense of a political institution, and the word “stability” are derived from the same Latin source, “*stare*” (to stand).

All these equilibrium phenomena can be incorporated more or less into individual beliefs about the salient ways in which various types of societal games are played together and how they are related, that is, into “subjective game models” that are the players’ personal perceptions of structures of societal games. They are interconnected across individuals by shared beliefs or common knowledge as described before, supplemented by individual-specific knowledge and beliefs.⁹ With the aid of respective subjective game models, people perceive new problems, attempt to find solutions and implement them. At this moment personalized beliefs, both positive and predictive, may play a role.¹⁰ Positive beliefs, such as political credo/ideology/opinion or moral faith/judgment, represent individual convictions

⁸ For an idea of a general formulation of the social-exchange game, see Aoki (2007).

⁹ In the 1990 book, North states that “subjective models show no tendency to converge.” (1990:p. 17) But I presume he modified this view in the 2005 book.

¹⁰ See Aoki (2007: Chapter 9) for a more detailed argument of what follows.

regarding the ways the game *should* be played (different from prevailing ones) in the political and social exchange domains. Predictive beliefs of entrepreneurial represent their conviction/intuition that a certain novel ways of playing an economic game *would* work. If a new way of play based on individual beliefs becomes a focal point for evolutionary change and is accepted, followed and/or emulated by others, those beliefs will become shared beliefs in the sense of common knowledge regarding the way the game is actually *being* played together. Then it will become unbeneficial for anyone to ignore or act against them, at least in the short run, regardless of whether they liked them or not as a matter of the normative judgment. In Part II of his 2005 book, the narration of actual history, North primarily uses the word “belief” in the positive/predictive sense (precisely speaking, more in the positive sense). But I presume that the above reasoning is not necessarily inconsistent with North’s thoughts, particularly those expounded in Part I. In any case, one must admit that formulating political and social exchanges in game form and analyze the dynamic interactions of play across various domains is still in its infancy. However, our attempts to carry this out will be enormously encouraged and influenced by North’s call for an inter-disciplinary approach to institutions that he has so lucidly and convincingly narrated in his 1990 and 2005 books.

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