Culture as Cognition and Behavior:

How Categorization Can Shape Interaction (and How Leaders Can Shape Categorization?)[*]

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"Culture is one of the two or three most complicated words in the English language" (Williams, 1983:87). Perhaps as a result, an overview "estimated that there were more than 160 definitions in use" (Steinmetz, 1999: 5).

For decades, economists paid minuscule attention to culture, but this is changing rapidly.[1] One view of culture emphasizes "values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation" (Guiso et al., 2006: 23), and one way to model such values is to enrich the arguments of an actor's utility function to include actions by others in the actor's social context (e.g., Hoff and Stiglitz, 2016).

In addition to affecting values, social context can also affect an actor's perception and cognition. To give just two classic examples, Douglas's (1966) *Purity and Danger* describes how the distinction between "pure" and "unpure" is construed differently in different societies, and Goffman's (1974) *Frame analysis* describes cognitive frames as "schemata of interpretation" that allow actors to "perceive, identify, and label" both natural events and actions by others. Consistent with these and other landmark contributions, DiMaggio's elegant review describes culture as "*shared* cognitive structures" (1997: 264, emphasis added), echoing Geertz's (1973: 12) trenchant observation that "Culture is public because meaning is."

In this paper we pursue one approach to modeling culture as a shared meaning-making: categorization. As Savage (1954: 9) described single-person decision-making, "a smaller world is derived from a larger by neglecting some distinctions between states, not by ignoring some states outright." And for social settings, DiMaggio (1997: 276) summarized Zerubavel (1991) and many others with "the drive to partition a continuous world appears to be a human universal, though the nature of the categories constructed may vary significantly among groups."

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[1] DiMaggio (1994: 29) used ECONLIT to compute that "culture" appeared as a keyword in 0.17% of references during 1981-87 and 0.38% during 1998-92. Martinez et al. (2015: 331) found 1.12% for 1993-2000 and 1.83% for 2001-13.

To model categorization, we consider a continuous state space, where each state is associated with different payoffs in a 2x2 game. In each state, the game is dominance-solvable, so there is no need for one actor to consider the action of another. But, following Savage and Zerubavel, we take the state space to be too nuanced for actors to perceive fully, so they (unknowingly) categorize it into a finite partition. A group's culture is then its shared partition of the state space. Thus, in our model, culture determines (a) how an actor answers the question "What situation am I in?" (cognition) and (b) given the dominance-solvable game the actor perceives, what action to take (behavior).

We begin by analyzing the static case, asking how different cultures induce different outcomes. We find that culture (i.e., perceiving a partition cell rather than each individual state) can either help or hurt the parties' payoffs, relative to the (assumed impossible) case of full information. More specifically, in each cell of her partition, the dominance-solvable 2x2 game that an actor perceives is either a common-interest game (in which cooperation is the dominant strategy) or a prisoners' dilemma (in which defection is the dominant strategy). Different cultures are different partitions and hence induce different probabilities of perceiving the game as being common-interest or a prisoners' dilemma. In this sense, culture can produce either a "fog of cooperation" (more partition cells are perceived as common-interest games, and expected payoffs exceed the full-information benchmark) or a "fog of conflict" (more partition cells are perceived as prisoners' dilemmas, and expected payoffs are below the benchmark).

Having constructed this simple model of categorization, we exercise it in two ways: first, we consider a repeated game played by two actors from a common culture; second, we consider (in the static game) how a leader might change two actors' shared culture.

In a repeated game under a fixed culture, the parties may be able to improve on their static payoff in the usual way, depending on discounting. We focus instead on the opposite comparative static: fix the discount factor and ask how different cultures perform. In particular, restricting attention to trigger-strategy equilibria, we compute the best equilibrium under a given culture, and we then compare the payoffs from these best equilibria across cultures.

We see our repeated-game analysis as a useful complement to the point that different equilibria in a given repeated game might correspond to different cultures with different payoffs. This point may be correct, but it implies that the parties in a culture / equilibrium with a low payoff know that other cultures / equilibria exist with higher payoffs, raising the (usually unmodeled) question of why the parties do not switch equilibria. In our model, in contrast, the parties play the best equilibrium that their culture allows them to perceive, so they have no reason to consider switching to or even searching for a superior equilibrium.

As in the static case, in the repeated game we again find not only that different cultures induce different payoffs but also that these payoffs can be above or below the full-information benchmark (i.e., culture can create fogs of either cooperation or conflict). The fact that different cultures induce different payoffs suggests the question of whether culture could be changed so that payoffs increase. As a first exploration of this question, we consider a leader endowed with a finer partition than do the two actors analyzed in our static and repeated settings, and we ask whether such a leader might tell stories, or use language, or create prototypes so as to change the

actors' culture. In this initial analysis, the leader does not refine the actors' original partition, but instead moves them from one partition to another. We relate these actions by a leader to case studies uch as the Post-It story at 3M, the change in language from "computers" to "software" at IBM, and the creation of five prototype cars and market segments in the early days of GM.

Throughout this paper we assume that any two actors come from a single culture. We defer to future work the fascinating question of what happens when two actors are from different cultures (i.e., hold different partitions). As a first step in that direction, however, we note that applying our model to players from different cultures should produce dynamics in the spirit of a weaker equilibrium concept than Fudenberg and Levine's (1993) self-confirming equilibrium: Fudenberg and Levine allow players' beliefs to differ about actions off the equilibrium path, whereas our dynamics will require a weaker equilibrium concept because differences in expected actions may arise on path. We expect to relate such dynamics to case studies of difficulties in building and changing relational contracts, such as at Credit Suisse First Boston (Stewart, 1993) and Oticon (Foss, 2003).

Finally, while this draft is too immature to contain a full literature review, we would be remiss not to mention perhaps the first economic model of culture, by Kreps (1990), who discusses both aspects of culture that we capture in our title and our model: cognition and behavior. Concerning cognition, Kreps describes (but does not model) culture as a common frame for interpreting unforeseen contingencies; concerning behavior, he offers a repeated-game model of "how we do things around here." In our model, each 2x2 game is dominance-solvable, so there is a one-to-one mapping from cognition (the partition that players share) to behavior (the dominant strategies they play in a given partition cell).