



Differential awareness, ambiguity, and incomplete contracts: A model of contractual disputes[☆]

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ABSTRACT

We focus on aspects of differential awareness that give rise to contractual disputes. Parties to a contract are boundedly rational as the state space available to them is coarser than the complete state space. Hence, they may disagree as to which state of the world has occurred, and therefore as to what actions are required by the contract. Such disagreement leads to disputes. We show that the agents may prefer simpler less ambiguous contracts when facing potential disputes.

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1. Introduction

A complete contract between unboundedly rational parties should specify, for each possible state of the world, an action for each party. No dispute should arise, since any potential source of dispute should have been anticipated in the design of the contract. In reality, however, contracts do not completely specify the actions required of the parties and disputes take place regularly.

The idea that incompleteness in contracts arises from an inability to specify and contract on the state space is not new; it has been a standard argument at least since Williamson (1975, 1985) drew attention to the importance of transactions costs in determining contractual structures. These transactions costs are typically imputed to incompleteness of the state space. However, as Maskin and Tirole (1999) observe, incompleteness of the state space is not, in itself, sufficient to preclude the achievement of the first best contract. They conclude (p. 106) that '[i]f we are to explain "simple institutions" such as property rights, authority (or more generally, decision processes), short-term contracts and so forth, a theory of bounded rationality is certainly an important, perhaps ultimately essential ingredient'.

Recent developments in the analysis of unawareness and differential awareness (Board and Chung, 2007, 2009; Heifetz et al., 2006, 2010; Halpern and Rêgo, 2006, 2008; Li, 2009; Grant and Quiggin, 2012) have laid the basis for a theory of

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contractual incompleteness based on bounded rationality. In this literature, the unrealistic assumption that individuals can consider, and plan for, all welfare-relevant contingencies is replaced by models in which awareness is bounded and evolves dynamically as unforeseen contingencies are realized. In particular, in models of interactive differential unawareness, standard, but computationally demanding and implausible, assumptions about common knowledge are dropped. Individuals are assumed both to be boundedly aware and to impute bounded rationality to others.

In this paper, we focus on aspects of differential awareness that give rise to contractual disputes. By differential awareness, we mean that the parties to the contract may be aware of different things. Our modeling technique will be to treat the unawareness in a reduced form described by dispute relations, which transforms the problem into one of ambiguity. While this differs from approaches to unawareness in the line of Heifetz et al. (2006), it is a tractable alternative for attacking contractual disputes. We model boundedly rational agents as reasoning with respect to a subjective state space that is coarser than the completely specified state space in which all welfare-relevant contingencies are represented. Furthermore, even though different agents may use a common language to describe a contract, their semantic interpretations of that language may differ. Hence, they may disagree as to which state of the world has occurred, and therefore as to what actions are required by the contract. Such disagreement will lead to contractual disputes. If agents understand differential awareness, they may prefer simple and unambiguous contracts to more fully specified contracts that are more liable to generate disputes.

Formally, we represent agents' understanding of differential awareness using the Gul and Pesendorfer (2010) expected uncertain utility model and the assumption that disputes give rise to a 'war of attrition' game in which both parties receive the (mixed-strategy equilibrium) expected utility equal to that associated with their least-favored interpretation of the world. Our approach establishes a connection between aversion to semantic ambiguity (the sense in which the term 'ambiguity' is normally found in ordinary usage) and state-contingent ambiguity (the sense in which the term is commonly used in decision theory).

Given these preferences, we show that for a two-agent bargaining process over risk-sharing contracts, an individually rational and efficient contract involves a trade-off between risk and ambiguity. A finer contractual specification increases the gains from risk sharing when the contract is implemented successfully, but also increases the ambiguity of the contract and creates more possibilities for dispute. In this context, we find that risk aversion makes agents more likely to engage in contracts involving ambiguous terms and discuss the trade off between risk aversion and willingness to contract in the face of ambiguity.

The paper is organized as follows. We begin in Section 2 with an illustrative example that will be used to present results throughout the paper. In Section 3, we lay out the framework in which contracts are specified and then develop the concept of contractual ambiguity. In Section 4 we adopt Gul and Pesendorfer's expected uncertain utility model and derive preferences over ambiguous contracts. In Section 5 we formulate the associated bargaining problem and characterize the set of individually rational and efficient contracts. In Section 6 we discuss the implications of our analysis and its relationship to the existing literature on incomplete contracts and bounded rationality.

2. An illustrative example

In informal discussions of ambiguous contracts, it is common to refer to 'gray areas'. Some contracts, or contingencies specified in contracts, are seen as having gray areas, thereby giving rise to possibilities of disagreement and dispute, while others are seen as relatively clear-cut and unambiguous.

We develop these ideas in an example.¹ Suppose two individuals, player 1 and player 2 contemplate entering into a risk-sharing contract. They will draw a card from a pack. The card may be all white, all black, all red or it may be white at the top and black at the bottom. From the viewpoint of a fully informed outside observer there are four possible states of the world, one for each card.

Each player sees the world as white, black or red. However, player 1 although not explicitly aware of this, always observes the bottom half of the card. Player 2 always observes the top half, although again he is not explicitly aware of the 'orientation' of his view. Thus, if the card is white at the top and black at the bottom, player 1 will construe the card is black, while player 2 will construe it as white. The underlying state space and the two individuals' partitions of the black–white–red spectrum are summarized in Table 1, where X denotes a pair of observations that is inconsistent with the problem description and therefore does not correspond to a state. Suppose the state-contingent endowments of the two individuals are given in the bi-matrix of Table 2.

Each individual faces a single source of uncertainty that is measurable with respect to his or her own partition of the state space. We assume that both players are risk-averse and view the three elements of their respective partitions as 'exchangeable' (Chew and Sagi, 2006).² Hence both parties would prefer the non state-contingent allocation (2, 2) in every

¹ We are indebted to Bob Brito for suggesting this example.

² In this context, 'exchangeable' is equivalent to each individual being indifferent between betting on any element of his or her partition.

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