ASYMMETRIC CONFLICTS WITH ENDOGENOUS DIMENSIONALITY

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This article examines a two-stage model of asymmetric conflict based on the classic Colonel Blotto game in which players have, in the first stage, the ability to increase the number of battlefields contested. It thereby endogenizes the "dimensionality" of conflict. In equilibrium, if the asymmetry in the players' resource endowments exceeds a threshold, the weak player chooses to add battlefields, while the strong player never does. Adding battlefields spreads the strong player's forces more thinly, increasing the incidence of favorable strategic mismatches for the weak player.

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I. INTRODUCTION

Conflict often takes place across multiple component contests or "battlefields." In this article we consider a two-player, two-stage game in which players start with a fixed endowment of a resource and a given...
number of battlefields. In the first stage, the players have the ability to simultaneously create additional battlefields. In the second stage they allocate their respective stocks of the resource across the updated set of battlefields in order to maximize the expected proportion of the individual component contests won. We are therefore concerned with the endogeneity of the number of battlefields, or the "dimensionality" of the conflict.

The battlefields in this game may be taken literally to be points of combat or fronts of a military campaign, where opening up a new battlefield means expanding the geographical scope of the conflict. Or they may refer to collections of targets within a transportation or computer network in the context of counter-terrorism or information systems security efforts.

In sports contests, battlefields may be interpreted as the individual player contests within the overall match, such as a cornerback trying to "lock down" a receiver in American football, a defender marking a striker in football, or any of the five individual one-on-one matchups in basketball. Alternatively, they may be interpreted as the clash between distinct skill sets within the overall match, such as passing versus pass defense in American football or left-handed pitching versus left-handed hitting in baseball.

It is also possible to interpret the number of component contests or battlefields within a conflict more directly as the different dimensions of the conflict. For instance, when firms compete in a market for a bundled good that has multiple patentable components, one might interpret the race to patent a given component as a dimension of the conflict. Similarly, political campaigns involve multiple issues and multiple segments of voters. Winning the contest over each of these issues or segments may be viewed as succeeding in a given dimension of the contest.

To examine the issue of the endogeneity of the number of battlefields or dimensionality of a conflict, we augment the classic Colonel Blotto game of Borel (1921) to allow for a preconflict stage in which players have the ability to increase the dimensionality of the conflict. The Colonel Blotto game is a foundational model of conflict with multiple component contests and was one of the first problems examined in modern game