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Bargaining and Intersectional Disadvantage: Reply to O'Connor, Bright, and Bruner

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In "The Emergence of Intersectional Disadvantage," O'Connor, Bright, and Bruner model identity-based oppression as the result of bargaining interactions between groups. They find that when individuals interact both within and between groups, minorities tend to be disadvantaged and that this is compounded by intersectionality. O'Connor et al. argue that this effect can occur due solely to differences in the learning dynamics for smaller and larger groups. Here, we extend their model to a broader array of bargaining scenarios involving more offers and higher stakes. We find that variations of the game can produce non-additive minority advantages rather than disadvantages. These results reveal a limit the explanatory power of this effect for understanding intersectional disadvantage and suggests the greater importance of other factors such as power differences, historical precedent, or bias.

On the Nash Demand Game Model

O'Connor et al. model interactions using the Nash demand game, building on previous studies (Skyrms 1996, Skyrms and Zollman 2010, Bruner 2017). In this game, there are two players and each makes a demand for some portion of a shared resource. If the sum of demands is more than the total resources, there is a "disagreement" (usually each player receives zero payoff). Otherwise each gets their demand.

Individuals in an infinite randomly mixing population are matched to play the game. Each individual has two cultural identities (gender, race) and a specified strategy for playing the game against members of their own group and members of other groups. It is assumed that there are two races and two genders and thus four intersectional identities. P1 and P2 represent the majority and minority gender proportions respectively; Q1 and Q2 represent the same for race. Cultural evolution occurs as individuals update their strategies by imitating the successful strategies of others from their group.[1]

O'Connor et al. develop three different models of intersectional bargaining: Minimal, Moderate, and Strong. In the minimal model, there are two separate bargaining "arenas;" in the p-arena (gender), one's p-identity (male/female) is salient, and in the q-arena (race), one's q-identity (white/black) is salient. Populations update their strategies only with respect to their salient identity, e.g., women learn the more successful p-arena strategies of other women, regardless of their race. In moderate, there are still two arenas, but now strategies are updated based on the payoffs of others in the same *intersectional* identity; e.g., black women will imitate the strategies other black women regardless of arena. In strong, there is a single arena that combines both race and gender and one's intersectional identity is salient.

[1] Both our simulations below and those from O'Connor et al. use the discrete time replicator dynamics to model imitation (Weibull 1995). In this dynamic, the frequency of type i is updated at a rate proportional to the ratio of i's fitness and the average fitness of the population: $x_i' = x_i$ (Expected payoff of strategy i in population X / Average fitness in X). Simulations were initialized using random proportions of each strategy drawn from a uniform distribution of the population space and we ran 10,000 simulations for each of the results presented below. Our simulation code is available at <https://github.com/drassaby/egt>.

For simplicity, O'Connor et al. employ a reduced version of the Nash demand game that involves only two strategies (see Table 1). The central finding across all three models is that minority groups tend to end up making low demands against majority groups making high demands. Bruner (2017) was the first to notice this in models with just one cultural identity, and O'Connor et al. show this is also true for intersecting identities. The reason for this is the "Cultural Red King Effect" where smaller groups tend to evolve more quickly and will tend to accommodate the larger group's demands. Moreover, in the moderate and strong models, intersectional minorities (being a member of both P2 and Q2) tend to be disproportionately disadvantaged in bargaining contexts, showing a non-additive disadvantage as intersectionality theory suggests (e.g., Bright et al. 2016).[2] Furthermore, resulting disadvantages are compounded when power is introduced (D > 0).

		Player 2	
		Low (4)	High (6)
Player 1	Low (4)	4,4	4,6
	High (6)	6,4	D,0

Table 1: The mini Nash demand game used by O'Connor et al.[3] D=0 when there is no power asymmetry between players, D>0 if Player 1 has more power.

Including More Strategies

The game used by O'Connor et al. noticeably lacks the possibility of a fair offer. Such an offer is usually included in similar models (e.g., Bruner 2017, Rubin & O'Connor 2017, O'Connor & Bruner 2019, Schneider, Rubin & O'Connor 2019, and Cochran & O'Connor 2019). Introducing a fair offer creates an equilibrium where all parties make fair offers (see Table 2).

[2] O'Connor et al. argue, and we agree, that the best way to conceptualize *additive* disadvantage would be if members of both P2 and Q2 were likely to experience disadvantage with probability x+y-xy (assuming independence of group identities, where x and y are the chances of each minority group to experience disadvantage). If the probability of experiencing disadvantage for this intersectional group is greater than this, then it is *non*-additive.

[3] Not including the possibility for a fair offer simplifies the implementation of the model, but also makes this game equivalent to Hawk-Dove (also known as Chicken and the Snow Drift Game).

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		Player 2		
		Low (4)	Fair (5)	High (6)
Player 1	Low (4)	4,4	4,5	4,6
	Fair (5)	5,4	5,5	D,0
	High (6)	6,4	D,0	D,0

Table 2: The mini Nash demand game including a fair offer.

To investigate the effects of adding this offer, we first replicated the model and results of O'Connor et al., modified the game and ran computer simulations.[4] Our results reveal that the addition of a fair offer does not significantly alter the core message. The majority groups are still more likely than not to demand high, and the most likely outcome of all possibilities is that the majority groups demand high in both arenas (see Figure 1).

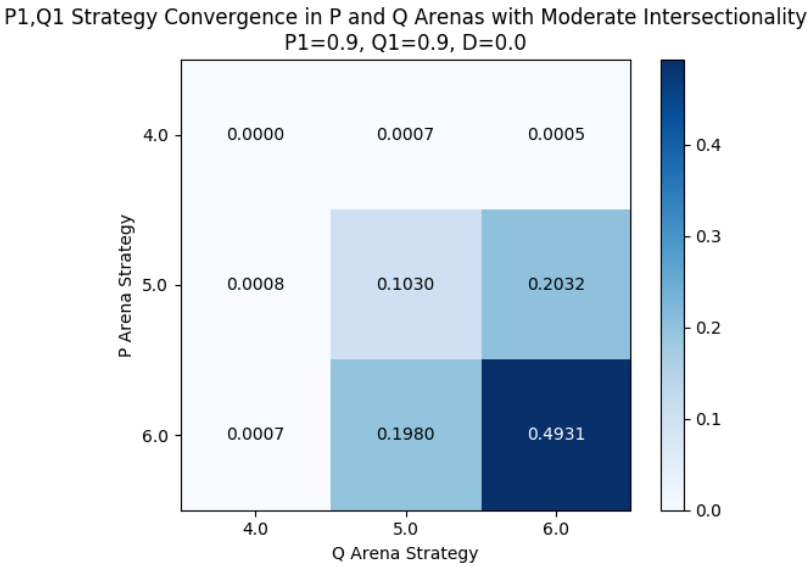

Figure 1: Heatmap showing the proportion of simulations that resulted in the majority groups converging on each strategy for the Moderate model, with the addition of the fair strategy. These results are also similar to those of Bruner (2017) in the one-identity case.

[4] Our replicated results showed minor quantitative differences in the case of moderate intersectionality but did not have any differences that affected the qualitative conclusions.

If we continue to add more strategies, however, an important difference emerges. As more demands are introduced, we see not only that fair outcomes are predominant but that the minority tends to have a slight advantage when things are not fair. Figure 2 shows the results when we include demands of 1, 3, 5, 7 and 9.

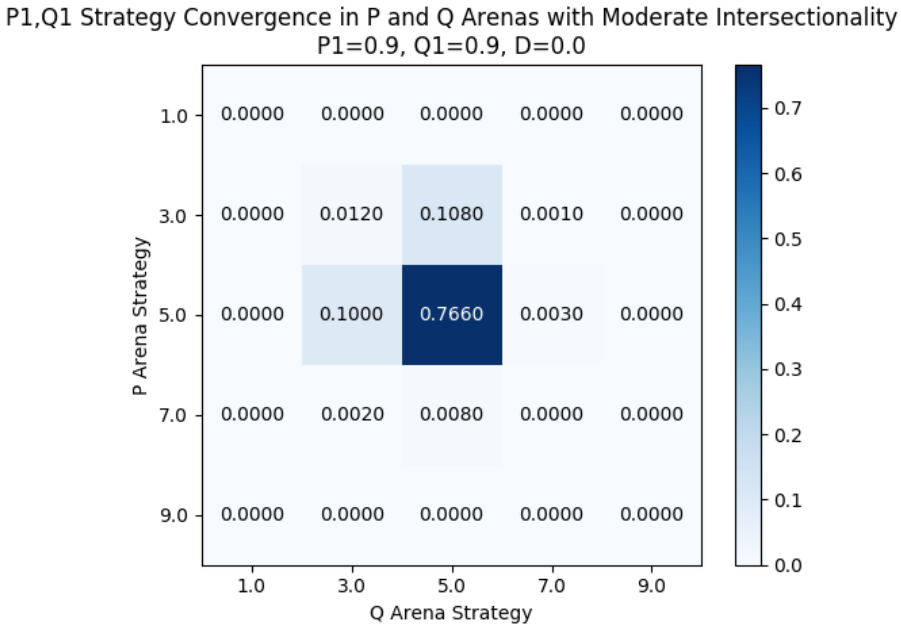

Figure 2: Heatmap showing the proportion of simulations that resulted in the majority groups converging on each strategy in a 5-strategy game.

O'Connor (2017) saw a similar effect in agent-based models with single-dimension minorities, noting that with more demands higher demands tend to do better early on and, "As a result, the smaller type more quickly moves towards these higher demands" (p.13). Our results show that this is also true in the intersectional case. Moreover, the key is not the number of strategies but the range of demands. For instance, using 3, 4, 5, 6, 7 instead of those in Figure 2 restores a tendency toward majority advantage.

Changing the Stakes

The importance of stakes can be illustrated by simply changing the high and low demands but keeping the two-strategy structure from Table 1. Suppose that High demands 9 and Low demands 1, instead of 6 and 4. This might represent a higher stakes negotiation situation where there is a clear winner and a clear loser. In this higher stakes contest, there is now a minority advantage (Figure 3).

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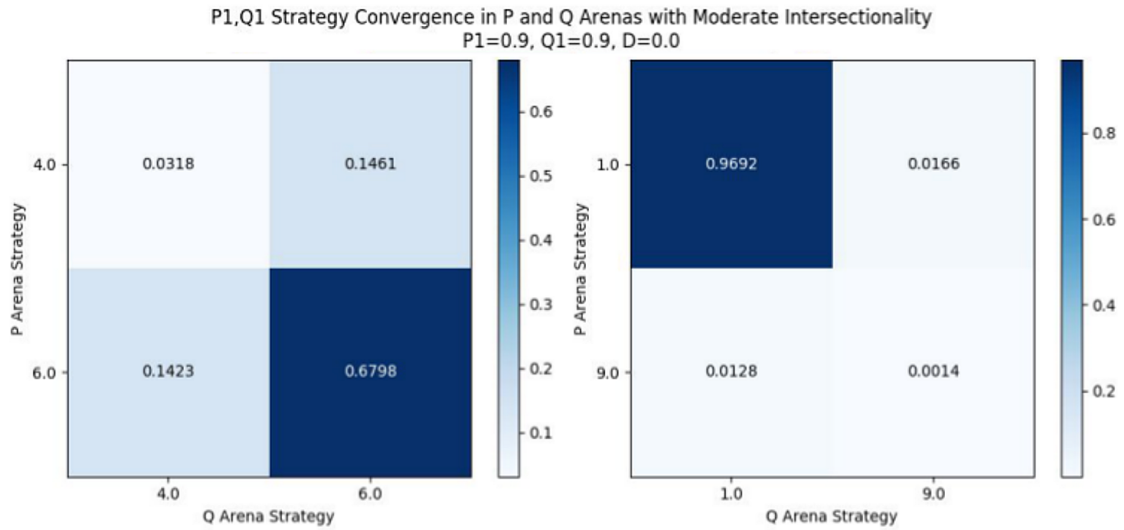

Figure 3: The difference between high and low stakes for moderate intersectionality. Heatmap shows the chance of the majority group converging on each strategy in the P and Q arenas.

O'Connor (2017) also noticed this effect in agent-based simulations with only a single minority group and, again, our results show that this holds for the intersectional case. The reason is that if the contest has higher stakes, the chance of success when making high demands outweighs the risks of the occasional disagreement. Since the minority groups evolve faster, they converge on the more attractive high-demand strategy more often than majority groups. Assuming a uniform distribution over initial population states and D=0, we should expect a tendency toward minority advantage in the two-strategy case whenever L < ½H. Note that if the distribution over initial states is not uniform, the smaller group will trend toward the higher expected payoff given the distribution. Consequently, if the majority group tends to start in a position with significantly more H demands, the minority group will tend to converge on the L strategy. That's just to say that initial conditions (i.e., historical precedent) may be a major determining factor.

Furthermore, just as O'Connor et al. showed that moderate intersectionality creates a non-additive disadvantage for intersectional minorities in the H=6 and L=4 case, our results show that there are cases in which non-additive *advantage* for intersectional minorities emerges. For example, in simulations of the H=7 and L=3 case with P1=Q1=.9, the chance of some advantage for the minority (in either arena) is approximately 80.5% in the minimal case (which is additive), whereas approximately 88.5% of simulations in the moderate case had some kind of minority advantage. Thus, with even slightly higher stakes, there is a minority advantage and it is greater than additive with moderate intersectionality.

Power and Precedent

In the case of gender, the assumption that P1=Q1 is not realistic. Women are oppressed, and black women are intersectionally oppressed, but women are not oppressed as a *minority*; they are not a minority at all. O'Connor et al. show it is possible to generate a disadvantage for one group by giving the other group more power (D>0 for that group). Introducing power into our modified models can easily generate a minority disadvantage that overpowers the population size effects that would otherwise lead to minority advantage. In the same arena where population size effects are favoring the minority, we can give the *majority* group enough power to compensate. If D>L for the majority group, they will never converge to a disadvantaged state since it would be better to simply accept disagreements. And, for every case we have considered, there is some value of D (where D<L) such that we overcome any tendency toward minority advantage.

Precedent can also have a significant influence on the results. We can explore this by selecting initial conditions biased toward the majority making high demands when paired with other types. Figure 4 shows that as this initial proportion increases, the probability of a resulting majority advantage increases and reverses any tendency toward minority advantage that comes from the learning dynamics. This, of course, begs the question about why that precedent exists, but does illustrate the significance of the historical starting point.

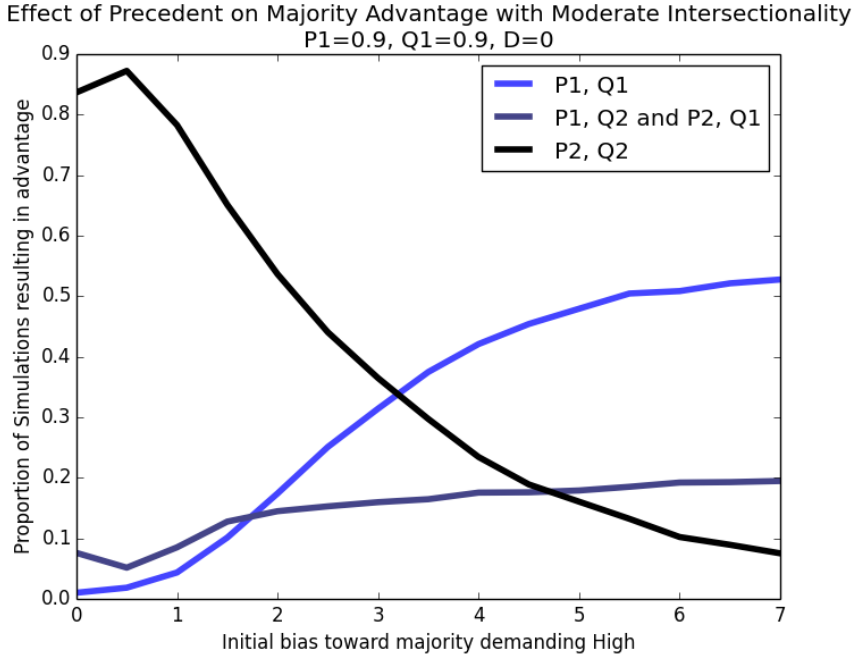

Figure 4: Graph showing the proportion of simulations that resulted in a given group demanding 'High' toward out-groups in both arenas as a function of initial bias in population states. The x-axis represents a factor for initial proportions of High-demand strategies for the majority groups.

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Conclusion

O'Connor et al. claim to find "minimal conditions for the emergence of intersectional disadvantage" enumerating them as follows:

> ...(1) intersecting minority demographics (or intersecting groups with power differentials), (2) actors who learn to behave in their best interest and (3) a strategic interaction that involves resource division. These minimal conditions tell us that intersectional disadvantage is easy to generate, underpinning claims by intersectional theorists that systems of power and oppression cannot be understood without understanding intersectional effects (35).

We agree that it is possible to get intersectional disadvantage in such cases provided a fourth condition is met. Namely, (4) the bargaining interaction involves low and high demands that are sufficiently close to the even-split. Otherwise, minorities may actually be advantaged and intersectional minorities greater than additively advantaged.

We in no way want to argue against claims made by intersectionality theorists about the importance of intersectional effects. There is, we take it, intersectional disadvantage, and the question is how best to explain it. The dynamic of group-size generates different results for intersectional minorities depending on the circumstance. Thus, for the cultural Red King effect to be part of an explanation for real intersectional disadvantage, we need to know whether real bargaining scenarios are more like the 6-4 case or the 9-1 case. Perhaps it is difficult to say, or perhaps there is a wide range of different bargaining scenarios that are not well captured by a single game. It is clear, however, that power, precedent, or other biases that favor certain groups over others will tend to bring about intersectional disadvantage. Indeed, O'Connor et al. admit those factors "are important to full explanations of real-world oppression" (p.35). However, given the complex consequences of the dynamics of different group sizes, we are not yet convinced that it is also an important part of full explanations.

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