# Identities, Communication, Repetition, and Other-Regarding Choices in Voter Coordination Games[1]

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**Abstract**

We make four contributions to the literature on voter coordination and identities: First, we find that natural identities have a stronger negative influence on coordination than payoff relevant minimal identities. Second, communication and repeated interaction can significantly increase coordination in both cases. Third, we show that multiple natural identities negatively affect coordination, but repetition and communication can alleviate the effects, although not as easily when identities conflict. Fourth, we show that voters easily coordinate on an other-regarding choice when they have only minimal identities but find it difficult to coordinate without repetition and communication when identities are naturally occurring.

## Introduction

Collective choice institutions often require that voters with diverse preferences coordinate on a common choice in which not all receive their most preferred outcome but together they are able to defeat a less preferred outcome. Gary Cox's seminal work, *Making Votes Count* (1997) emphasizes the importance of coordination in elections through individuals choosing to vote strategically for a secondary choice.[1] For example, consider the following simple election where there are three candidates, $A$, $B$, and $C$, supported by three different groups of voters which we will call voter types $a$, $b$, and $c$. Assume that 30% of the electorate are type $a$ voters; their first preference is candidate $A$, their second preference is candidate $B$, and their last preference is candidate $C$. Similarly, assume that another 30% of the electorate are type $b$ voters; their first preference is candidate $B$, their second preference is candidate $A$, and their last preference is candidate $C$. The remaining 40% of the electorate are type $c$ voters; their first preference is candidate $C$ and they are indifferent between candidates $A$ and $B$ as their second choice. If everyone votes sincerely for their first preference and there are no majority requirements, candidate $C$ will win (voters of type $c$ trivially will always vote for candidate $C$, since they have no preference between $A$ and $B$). In order to defeat candidate $C$, then sufficient numbers of voter types $a$ and $b$ need to coordinate on either $A$ or $B$ such that $C$ is defeated.

Although in this simple example the benefits of coordination appear fairly obvious, as Cox and Myerson and Weber (1993) note, coordination does not always succeed. One oft-cited and famous example is the 1912 U.S. Presidential election where Wilson defeated Taft and Roosevelt with less than a majority of the vote, even though arguably he was the last choice of the largely Republican supporters of the other two candidates.[2] Essentially, in our simple example voters of types $a$ and $b$ are in a "team" version of the well-known battle of the sexes game. Failure to coordinate by at least some members of both teams leads to the lowest payoffs for both types

[1] See also Myerson and Weber (1993). Cox discusses coordination through strategic entry of parties and candidates as well.

[2] The 1972 New York Senate election is a similar example in which two liberal candidates split support resulting in a win by a conservative candidate with less than a majority support who was easily defeated for reelection.

of voters. In the one-shot version of the game, there are two pure-strategy equilibria in which types $a$ and $b$ coordinate, one in which they coordinate on candidate $A$ and the other in which they coordinate on candidate $B$. However, the payoffs for coordination on candidate $A$ are higher for type $a$ voters than for type $b$ and vice-versa for coordinating on candidate $B$; payoffs are asymmetric. So there are winners and losers when the two types of voters coordinate and the battle over who will have the higher payoff can impede coordination.

A frequently mentioned impediment to coordination in naturally occurring voting situations are pre-existing and long-standing divisions between voters along social and ethnic lines. A number of scholars contend that voters choose expressively and, as such, can be influenced by appeals to identity and identity cues by candidates and parties during elections.[3] These identity cues are presumed to prevent voters from finding common ground in political situations when coordination with other ethnic or social groups would be advantageous, particularly when coordination involves asymmetric payoffs and thus there are winners and losers within the coalition of diverse groups. Coordinating may mean that one ethnic group becomes subordinate to another over time, and even at significant costs individuals may be unwilling to be so dominated – unwilling to give up their ethnic identity – resulting in coordination failure.

Yet, as Chandra (2006) points out, identities (even so-called ethnic ones) are not exogenous or unidimensional. Within constraints, individuals can often pick and choose their identities and how much these identities govern their behavior. It is problematic to contend that an identity is an exogenous determinant of how an individual votes in an election if the identity and the salience of the identity are themselves choices of the individual. Chandra argues that what is relevant is whether an identity arises from "descent-based" attributes or not. Descent-based attributes, she contends, have two main properties – they are visible and they are subject to constrained change. Hence, we might expect that the extent that identity affects voter coordination may be related to the extent that the identity is characterized by attributes that are descent-based and

[3] See the review in Chandra (2006) and the classic work of Horowitz (1985).

therefore more difficult for an individual to "choose" to ignore. Furthermore, individuals also have multiple identities that a voter can choose between emphasizing. A voter might choose to follow an identity that helps him or her coordinate with others when such coordination is highly desirable, even at his or her own expense. Indeed, in a noteworthy study of coalitions between ethnic groups in Africa, Posner (2004) finds that Chewas and Tumbukas are allies and appeal to a larger encompassing identity when they are small in number and have strong needs for each other as coalition partners as in Zambia, but in different coalitions and adversarial when both groups are larger and need each other less as in Malawi.

A number of experiments have been used to explore the determinants of voter coordination in more than two-candidate elections as in our simple example [see Rietz (2008) for a review]. In the standard approach, voters are randomly assigned minimal payoff relevant identities (i.e. as either $a$ or $b$ voters in the example above) and the effects of institutions such as majority requirements or communication through pre-election polls and campaign ads on the extent of coordination are investigated. These exogenously assigned, but payoff relevant, minimal group identities appear to make voter coordination difficult. Although institutions and communication have some mitigating effects, coordination failures are prevalent.[4]

In this paper we add to the literature on the relationship between identity and voter coordination in four ways:

[4]Morton and Rietz (2008) find that 50% or more majority requirements are most effective institution to facilitate voter coordination as they allow voters to use the institution to ensure coordination with minimal strategic voting on their part. Bassi et al (2011) find that coordination failures are also influenced by the size of incentives and the complexity of the voting situation when one of the choices is arguably more focal (one of the groups involed in coordination is in the majority). They find that providing large financial incentives to ignore these identities appears to be effective in reducing their influence significantly when one of the choices is arguably more focal than the other. As Crawford et al (2008) show, when payoffs are asymmetric as in battle of the sexes coordination games and the voting games studied in these experiments, coordination failures are much more likely than when payoffs are symmetric (that is, in payoff symmetric coordination games there is no disagreement between types $a$ and $b$ in their preferences over the multiple coordination equilibria – in our example the voters preferences between candidates $A$ and $B$ are identical). Crawford et al find this inability to coordinate with asymmetric payoffs occurs even when one of the equilibria is arguably more "focal" than the other as well and facilitates cooperation when payoffs are symmetric. That is, option $A$ is arguably focal since it preceeds $B$ in the alphabet. Or, alternatively, labeling one option after a well-known landmark building such as the Sears Tower in Chicago and the other option a lesser known building should make the first choice focal (and does with symmetric payoffs). Yet Crawford et al find that focal points are not effective in leading to coordination in these types of games.

First, we compare the effects on voter coordination with asymmetric payoffs of the typical minimal group identities with naturally occurring identities that meet Chandra's definition of ethnic identities – each with distinct descent-based attributes. We argue that naturally occurring identities are more likely to provide voters with what we label as *expressive identity utility* which can affect voters' willingness to cooperate. We define expressive identity utility as utility one receives from voting for a candidate with the same identity independent of any instrumental concerns. We show how theoretically expressive identity utility can impede coordination. We then find support for the presumption that descent-based attributes have a stronger negative influence on the ability of groups to coordinate on a common choice as compared to minimal group identities. Thus, we establish that such identities can be potentially more problematic for coalition formation in the naturally occurring environment than those induced in the laboratory by minimal group identities.

Second, we investigate how coordination might or might not evolve through repeated interaction and communication even when individuals are divided on descent-based attributes (and receive expressive identity utility) as compared to minimal group identities. That is, it is well known that communication and repeated interaction can lead to increased coordination with minimal group identities with payoff asymmetries (see Rietz (2008) on voting games with more than two candidates and Cooper et al (1998) on battle of the sexes games which are similar in nature to the voting games we examine); we consider whether the effects of communication and repeated interaction are equally strong in leading to cooperation over time when voters are divided by more than minimal identities. We find that indeed communication and repeated interaction can significantly increase coordination even when individuals are divided by descent-based attributes. We find that over time the differences between coordination with minimal identities and descent-based ones becomes indistinguishable.

Third, we consider the effects of multiple identities, particularly combining identities that are arguably non-descent based and more easily changeable with descent-based, less changeable

identities. We examine the effects on coordination when these additional identities reinforce ethnic identities and when they conflict with ethnic identities. We find that multiple identities, both reinforcing and conflicting, make it significantly more difficult for groups to coordinate. Reinforcing identities appear to increase ethnic identity voting for some voters while conflicting identities appear to increase voter confusion. We find that repetition and communication are less successful in mitigating these effects than with single identities and that communication is in general less informative.

Fourth, we examine the effects of making one of the choices before the voters arguably more "other-regarding" in that the choice maximizes aggregate payoffs, minimizes inequity between voters, and maximizes the minimum payoff. We find that voters easily coordinate on the other-regarding choice when they have only minimal identities. Repetition and communication improves coordination, but becomes unnecessary over time. But when we add in naturally occurring ethnic identities, subjects find it difficult to coordinate without repetition and communication. Yet, unlike the case with multiple identities, repetition and communication proves highly successful in overcoming the ethnic identity divisions which prevent coordination when one of the choices is other-regarding.

In the next section we describe our basic experimental voting game and possible equilibria. In Section III we present our primary treatments, theoretical predictions, and our initial comparison of the effects on coordination minimal group identities with naturally occurring and descent-based identities both with and without repetition and communication. In Section IV we consider the effects of multiple identities, reinforcing and conflicting, and in Section V we examine the effects of having an other-regarding choice. Section VI concludes.

# I Basic Voting Game in the Experiment

In our experiments we used the following basic voter coordination game as illustrated in Table 1 below. Let $i = \{a, b\}$ represent a voter's type. There are two voters of each type. Subjects

vote for either Candidate $A$ or Candidate $B$ (abstention is not allowed). Let $j = \{A, B\}$ represent a candidate winning. The payoffs received for a voter of type $i$ if candidate $j$ is elected, $u_{ij}$, in experimental points, are given by Table 1 below (we explain how points were translated into subject payments subsequently when we elaborate on our experimental design). Hence, $u_{aA} = u_{bB} = 100$ and $u_{aB} = u_{bA} = 70$. In the event of a tie election, the cost of failing to coordinate is stark, each voter receives 0. Notice that the minimal identities of $a$ and $b$ are "payoff relevant" in that voters benefit through higher payoffs if the candidate who shares their assigned identity is elected. But these payoffs are purely instrumental benefits, that is, the voters do not receive any payoff simply because they choose to vote for the candidate who shares their identity independent of the outcome of the election.

**Table 1: Payoff Matrix with Minimal Identities**

| | Election Outcome | | | Number |
|---|---|---|---|---|
| Voter Type | $A$ | $B$ | Tie | of Voters |
| $a$ | 100 | 70 | 0 | 2 |
| $b$ | 70 | 100 | 0 | 2 |

Our voting game captures the essence of strategic voting and coordination. It is also a team battle of the sexes game. Unless three of the four voters can coordinate on either $A$ or $B$, all will receive 0. However, because of the asymmetry in payoffs, type $a$ voters benefit more from coordination on $A$ while type $b$ voters benefit more from coordination on $B$.

### I.1 Equilibria in the Basic Voting Game

Like the classic battle of the sexes game, the equilibrium predictions of our basic voting game illustrate the difficulties that can exist when voters wish to coordinate but have asymmetric preferences. In particular, it has multiple pure strategy Nash equilibria in which voters "coordinate" to avoid a tie election. Pure strategy symmetric Nash equilibria exist in which all voters coordinate on choosing $A$ and $A$ wins unanimously or coordinate on choosing $B$, with $B$ winning unanimously. However, these equilibria involve some voters choosing weakly dominant strategies and voting strategically when indifferent. That is, consider the case where all are voting for $A$. The $b$ type voters expect to receive 70 from the win by $A$, regardless of how they

vote. They are therefore indifferent between voting for $A$ and $B$, so an equilibrium exists in which they vote for $A$. However, given that only a majority is required for a candidate to win, asymmetric pure strategy Nash equilibria also exist in which three voters vote for $A$ ($B$) and one voter votes for $B$ ($A$). These equilibrium again rely on weakly dominant strategies and would appear to require considerable advance coordination on which voter would choose contrary to the other three. There is no Nash equilibrium in pure strategies in which voters are exactly divided into equal camps and a tie election is expected; in such a case any voter would prefer to change his or her vote and increase his or her payoffs from 0 to either 70 or 100 given what other voters are choosing.

To complicate matters further, there is of course also a nondegenerate symmetric mixed strategy equilibrium in which voters randomize between voting for $A$ and $B$. Assume that $p$ is the probability that a voter of type $a$ chooses $A$, $1-p$ is the probability she chooses $B$ and $q$ and $1-q$ are the probabilities that a voter of type $b$ chooses $B$ and $A$, respectively. Assuming symmetric voter strategies (i.e. voters of the same type use the same strategies), then a voter of type $a$ chooses $p$ such that voters of type $b$ are indifferent between voting for $A$ and $B$ and vice-versa. It is straightforward to derive the following reaction equations and the equilibrium prediction that $p^* = q^* = 0.69$, which is graphed in Figure 1 below:[5]

Reaction Equation 1 for a voter of type $a$:

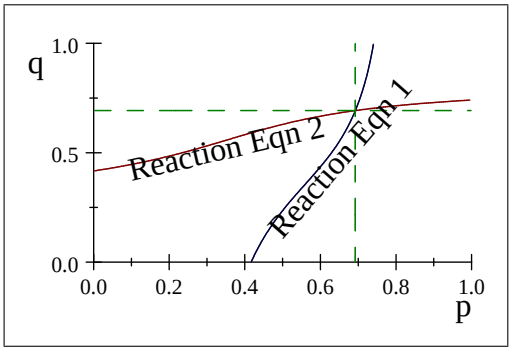
$340p + 100q + 510p^2q - 540pq - 240p^2 - 100 = 0$

Reaction Equation 2 for a voter of type $b$:

$540pq - 340q - 510pq^2 - 100p + 240q^2 + 100 = 0$

[5]The expected utility for one $b$ type voter from voting for $A$ given that other voters are using the symmetric mixed strategies is given by: $70(p^2(1-q) + 2p(1-p)(1-q) + p^2q) + 100(1-p)^2$ and for voting for B: $70p^2(1-q) + 100((1-p)^2\,q + (1-p)^2(1-q) + 2p(1-p)q)$. Setting these two utilities equal to each other yields Reaction Equation 1 in the text. Reaction Equation 2 can be similarly derived.

**Figure 1: Symmetric Mixed Strategy Eq. in Basic Game**




Note that in the symmetric mixed strategy equilibrium all voters engage in some identity voting, choosing their identity candidate more than 2/3 of the time. Furthermore, as is found in traditional battle of the sexes' games, the symmetric mixed strategy equilibrium yields a lower expected payoff for all actors than in any of the pure strategy equilibria identified above, an expected payoff of 49.28 compared to 70 for a voter who coordinates strategically on his or her second choice and 100 if voters coordinate on a voter's first choice. The expected payoff from the symmetric mixed strategy equilibrium is also lower than the expected payoff of a correlated equilibrium in which voters coordinate between coordination equilibria via an independent randomization device or a neutral outside observer such that with 50% probability all coordinate on $A$ and 50% probability all coordinate on $B$, which has an expected utility of 85. Voters therefore should have considerable incentive to attempt to coordinate on one of the pure strategy equilibria or some sort of correlated equilibria.

## I.2 Adding in Expressive Identity Utility

In our study we are interested in the extent that identity impedes coordination. As is clear from the above analysis, theoretically even minimal identities that are instrumental can make coordination difficult because of the asymmetric nature of the payoffs. In our study, however, we wish to investigate the effects of identities above and beyond minimally induced ones. Such identities may not be payoff relevant, but may lead voters to be unwilling to vote strategically for a candidate of a different identity.

We thus expand our voting game and assume that subjects receive additional utility from voting their identity, which we label $w_i$, where $w_i \geq 0$. This utility is best called expressive or consumption utility since it is derived purely by voting one's identity and is independent of who wins the election. For simplicity of analysis, we assume that $w_i$ are common knowledge to all voters. We assume that the utility from voting one's identity is additively separable from the utility received from the outcome of the election. That is, the identity modified payoff matrix for the voters is given by Table 2 below.

**Table 2: Payoff Matrix with Expressive Identity Utility**

| | | Election Outcome | | |
|---|---|---|---|---|
| Voter Type | Voting Choice | $A$ | $B$ | Tie |
| $a$ | $A$ | $100 + w_a$ | $70 + w_a$ | $w_a$ |
| | $B$ | 100 | 70 | 0 |
| $b$ | $A$ | 70 | 100 | 0 |
| | $B$ | $70 + w_b$ | $100 + w_b$ | $w_b$ |

First we consider the simple special case where $w_a = w_b = w$. That is, consider the case where all voters receive the same expressive identity utility which is known to all voters. How does $w$ affect the pure strategy coordination equilibria identified above? It is clear that with expressive identity utility there are no longer symmetric pure strategy coordination equilibria in which all voters either choose $A$ or $B$. For example, if all voters are choosing $A$, then a $b$ type voter would prefer to vote for $B$ and receive utility of $70 + w$ as compared to 70. Thus, the only pure strategy coordination equilibria exist are the asymmetric ones in which the winning candidate receives a minimal coalition of three voters. Notably, these equilibria no longer rely on weakly dominant strategies for support if $w < 70$. Furthermore, these equilibria only exist if $w \leq 70$. That is, if $w > 70$, then the sole voter choosing contrary to his or her identity prefers to vote his or her identity and the coalition supporting coordination on a common candidate collapses.

Without expressive identity utility we found there were no pure strategy Nash equilibria in which candidates are exactly tied. Do such equilibria exist with expressive identity utility? As long as $w < 70$, such equilibria do not exist. However, when $w \geq 70$, the equilibrium in

which everyone votes his or her identity and the outcome is exactly tied is the only pure strategy equilibrium to exist.

What about the mixed strategy equilibria? Since $w$ is independent of the outcome of the election, but purely depends on voting behavior, it is the equivalent of adding a constant to the reaction equations 1 and 2 above, transforming these equations to the following:

Reaction Equation 1 with expressive identity utility for a voter of type $a$:

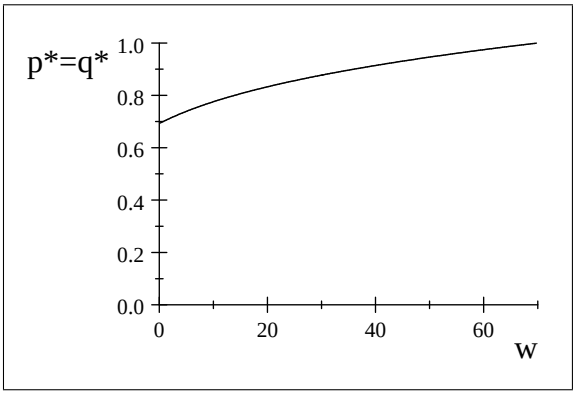
$340p + 100q + 510p^2q - 540pq - 240p^2 - 100 - w = 0$

Reaction Equation 2 with expressive identity utility for a voter of type $b$:

$540pq - 340q - 510pq^2 - 100p + 240q^2 + 100 + w = 0$

It is straightforward to show that the symmetric mixed strategy equilibrium values of $p^* = q^*$ increase as $w$ increases, such that for $w \geq 70$, the unique equilibrium is for all voters to choose the candidate that matches their identity and there is no nondegenerate mixed strategy equilibrium, as shown in Figure 2 below.

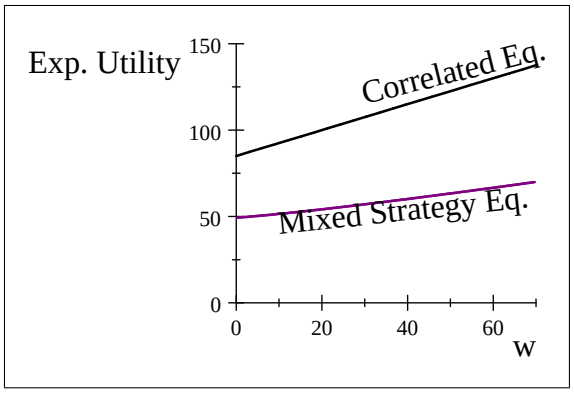
**Figure 2: Symmetric Mixed Strategy Equilibria and $w$**




However, for values of $w \leq 70$, correlated equilibria also exist which yield higher expected utility than the symmetric mixed strategy equilibria for every value of $w$. For example, consider the correlated equilibrium which randomizes equally across the four possible asymmetric pure strategy coordination equilibria as compared to the mixed strategy equilibrium for given values of

$w$,graphed in Figure 3 below.[6] While the expected utility from the mixed strategy equilibrium rises to 70 as $w$ approaches 70 as shown in Figure 3 as well, the expected utility from the correlated equilibrium increases to 137.5, which is greater. However, for values of $w > 70$, the randomized correlated behavior is no longer an equilibrium as it is no longer a best response for the sole voter designated to vote strategically to do so.

**Figure 3: Expected Utility when $w \leq 70$**




Hence, for values of $w < 70$, voters clearly would prefer the correlated equilibrium or any of the asymmetric pure strategy equilibria to the mixed strategy equilibrium. Yet, coordinating on one of these other equilibria is likely to be difficult, particularly since these equilibria require use of asymmetric strategies. We contend that naturally occurring identities are more likely to provide voters with expressive identity utility, $w > 0$, than minimal group identities. Thus, our results suggest that when naturally occurring identities provide equal expressive identity utility they are more likely to lead to coordination failures and higher levels of sincere voting than minimal group identities.

[6] The expected utility in the mixed strategy is given by: $240(\sqrt[3]{\frac{1}{1020}w+\sqrt{\frac{1}{1040\,400}w^2+\frac{1409}{67\,652\,010}w+\frac{8161}{60\,886\,809}}+\frac{1409}{132\,651}}-\frac{8}{289\sqrt[3]{\frac{1}{1020}w+\sqrt{\frac{1}{1040\,400}w^2+\frac{1409}{67\,652\,010}w+\frac{8161}{60\,886\,809}}+\frac{1409}{132\,651}}}+\frac{26}{51})^3-410(\sqrt[3]{\frac{1}{1020}w+\sqrt{\frac{1}{1040\,400}w^2+\frac{1409}{67\,652\,010}w+\frac{8161}{60\,886\,809}}+\frac{1409}{132\,651}}-\frac{8}{289\sqrt[3]{\frac{1}{1020}w+\sqrt{\frac{1}{1040\,400}w^2+\frac{1409}{67\,652\,010}w+\frac{8161}{60\,886\,809}}+\frac{1409}{132\,651}}}+\frac{26}{51})^2+240(\sqrt[3]{\frac{1}{1020}w+\sqrt{\frac{1}{1040\,400}w^2+\frac{1409}{67\,652\,010}w+\frac{8161}{60\,886\,809}}+\frac{1409}{132\,651}}-\frac{8}{289\sqrt[3]{\frac{1}{1020}w+\sqrt{\frac{1}{1040\,400}w^2+\frac{1409}{67\,652\,010}w+\frac{8161}{60\,886\,809}}+\frac{1409}{132\,651}}}+\frac{26}{51})$ and in the correlated equilibrium by $0.75w + 85.0$.

### I.3 Winners, Losers, and Differences in Expressive Identity Salience

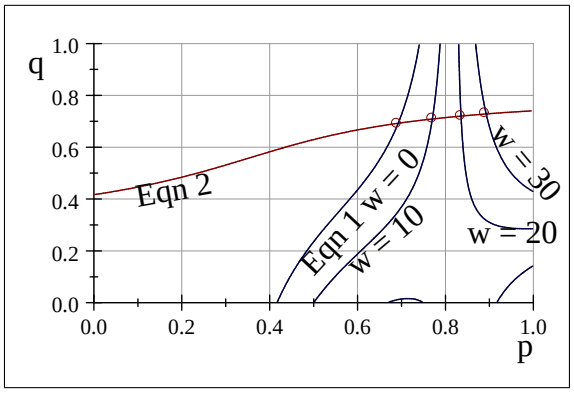
Our analysis so far assumes that there is no difference in the salience of expressive identities across voter types. What happens if voters differ in the value they place on expressive identities? Consider for example the simple case where $0 = w_a < w_b = w$. What are our equilibrium predictions under such a scenario?

First note that the symmetric pure strategy coordination equilibrium exists in which all vote for $B$, however the one in which all vote for $A$ does not. Asymmetric pure strategy coordination equilibria also exist when $w \leq 70$, both voting in favor of $A$ and $B$, although the one in which all vote for $A$ relies on weakly dominant strategies since only $b$ type voters receive expressive identity utility (when $w = 70$, both rely on weakly dominant strategies). If $w \geq 70$, however, only type $a$ voters are willing to choose strategically and only the asymmetric pure strategy coordination equilibria where one type $a$ voter chooses $B$ exists. What about equilibria in which candidates are tied? As long as $w_a = 0$, such equilibria do not exist as type $a$ voters will always be willing to vote strategically rather than have a tied outcome. Thus, we find that when one type of voters possesses high expressive identity utility, greater than 70, only one coordination equilibrium exists, facilitating coordination by voters on that type's preferred outcome.

What happens to the equilibrium values of $p$ and $q$ in the symmetric mixed strategy equilibrium when only type $b$ voters receive expressive identity utility? As mixed strategy equilibria rely on type $a$ voters choosing such that type $b$ voters are indifferent between voting for $A$ and $B$, the expressive identity utility for type $b$ voters has the perverse result of predicting greater identity voting by type $a$ voters than type $b$ voters in the mixed strategy equilibrium, as shown in Figure 4 below. Figure 4 shows the equilibrium values of $p$ and $q$ for values of $w = 0$, 10, 20, and 30. When $w > 0$, $p^* > q^*$. The highest value of $w$ for which a symmetric mixed strategy Nash equilibrium exists is 51.85 in which $p^* = 1$ and $q^* = 0.74$. For values of $w > 51.85 = \overline{w}$, nondegenerate symmetric mixed strategy equilibria do not exist, since voters of type $b$ cannot be made indifferent between voting for $A$ and $B$ and the only equilibrium that exists is in which

type $a$ voters, either singly or both, vote for $B$.

**Figure 4: Eq. values of $p$ & $q$ when $0 = w_a < w_b = w$**




It is straightforward to show that if $0 < w_a < w_b \leq 70$ then both types of asymmetric pure strategy coordination equilibria exist (that is, coordination on $A$ and on $B$ are both possible types of equilibria). If $w_a \leq 70 < w_b$ only the asymmetric pure strategy coordination equilibria exist where $B$ receives three votes and if $w_a > 70$, the only equilibrium which exists is where all vote sincerely for their identity candidate and the election is a tie. For $0 < w_a < w_b \leq \overline{w}$, we continue to find that mixed strategy equilibrium such that $p^* > q^*$, but by a smaller difference, and the limit value of $w$ increases, approaching 70 as the difference between $w_a$ and $w_b$ becomes smaller.

What about correlated equilibria? As above, correlated equilibria can again be established in which an independent mechanism is used to randomize between the pure strategy coordination equilibria as long as more than one exists in the above cases. For example, in the case above in which $0 < w_a < 70 < w_b$, a correlated equilibrium in which a neutral mechanism is used to randomize which type $a$ voter chooses strategically for $B$ in the asymmetric coordination equilibria is possible. As previously, these correlated equilibria lead to higher expected utility than the mixed strategy equilibria.

In summary, we find that when expressive identity utility varies across voter types, when voters can manage to coordinate there are more coordination equilibria which advantage the

candidate who is the first preference of those voters with higher expressive identity utility and for some cases these are the only pure strategy equilibria. However, when voters are unsuccessful in engaging in coordination and instead use mixed strategies, perverse results can occur where voters who have less expressive identity utility engage in greater identity voting. Finally, when the expressive identity utility is high, strategic voting disappears entirely, leading to only tie elections and complete coordination failure.

### I.4 Theoretical Predictions and Malleable Identities

Our theoretical analysis provides the following conclusions:

- Even when voters receive no expressive identity utility, when using mixed strategies they are more likely to vote their identity (more than 2/3 of the time), than strategically. Thus, identity voting can occur without any additional expressive identity utility, but simply due to a rational response to payoff asymmetries.

- When expressive identity utility exists, there are fewer coordination equilibria, and identity voting when coordination fails is greater than without expressive identity utility.

- When voter types vary in their expressive identity utility in coordination equilibria it is likely the case that voter types with greater expressive identity utility are advantaged with their candidates winning. However, when voters use mixed strategies and coordination failure is more likely, it is likely the case that voter types with greater expressive identity utility are not advantaged as the other voter type engages in more identity voting.

The analysis above assumes that expressive identity utility is exogenous, not subject to voter choice. Yet, as argued in the Introduction, some researchers suggest that individuals can choose the salience of their identities, within constraints. We do not dispute this conclusion. But we point to a difference between describing behavior and underlying preferences. Just because we observe that voters willingly abandon their identities does not mean that they do

not receive expressive identity utility when they choose to follow those identities. We find a number of coordination and correlated equilibria in which individuals abandon their identities to vote strategically, even though they would have received expressive identity utility from voting their identity. When coordination is successful, and tends to favor one voter type more often than another, such abandonment seems likely to indicate that the value of expressive identity utility is smaller relative to other voters who are advantaged by the strategic voting, which is not surprising. But when coordination is not successful, such abandonment may in fact indicate the opposite conclusion, which may be counter intuitive.

We now turn to our experimental investigation of the relationship between identity and coordination.

# II Comparison of Minimal and Natural Identities

Our first experimental results compare cooperative behavior in the voting game with only minimal identities (being assigned exogenously to the payoff relevant identities of types $a$ and $b$) to naturally occurring identities in which individuals are likely to receive expressive identity utility. We conducted our experiments at the Southwest University for Nationalities in Chengdu, China. This university has a significant population of native Tibetan students as well as a large number of Han Chinese students. Although there is generally little conflict between the two ethnic groups in the university, there have been protests by Tibetan students during times of tension in Tibet. However, compared to the general population, the animosity that the Han Chinese students have towards Tibetan students is less even when they have protests. Nevertheless, the ethnic distinctions between the two groups are noticeable, involve visible descent-based attributes, are difficult to change (differences in skin color and facial characteristics), and openly acknowledged by the students. Thus, we can think of the ethnic identities as largely immutable and predetermined for the purpose of the experiment.

### II.1 Baseline Treatment

In the *Baseline Treatment*, we used minimal group identities as is typical in such voting experiments. Subjects were randomly assigned to either type $a$ or type $b$ in which there were 2 voters of each type using the payoff matrix in Table 1 above. The candidates were always listed with candidate $A$ first. Subjects voted for either Candidate $A$ or Candidate $B$ (abstention was not allowed). There were no restrictions on how much time subjects could take to cast their votes. We conducted three sessions with 12 subjects each for a total of 36 subjects. The subjects were anonymously divided into 3 committees of 4 voters. Subjects were also in two separate rooms, 6 Han subjects in one room with 6 Tibetans in the other (we divided the subjects by rooms and ethnicity in order to make the experimental environment as similar as possible with the ethnic identity treatment described below). Subjects did not know which of the other subjects in their room were in their groups. Subjects were seated such that their choices were private and they could not observe the choices of other subjects.

Subjects played the game initially for one period without communication. They then played for 9 more periods with free-form pre-play communication. The committees were standing committees or fixed matchings, to facilitate coordination over time. After the 10th period, we used a random ending rule, with a 30% probability that there would be a new round, and 70% probability that there would be no new round. Subjects were paid for the first round plus one other randomly selected round. Subjects received 5 Chinese Renminbi for showing up for the experiment and (1/3) of each experimental point earned in the selected rounds was converted to 1 Renminbi.

### II.2 Ethnic Treatment

In the *Ethnic Treatment* we used the same voting game and experimental design with the exception that the candidates were given Han and Tibetan names, *Li Hanmin* and *Zhaxi Duoji*, respectively. The subjects were paid according to the same matrix as in Table 1 with the

exception that now candidate $A$ was labeled Li Hanmin and candidate $B$ was labeled Zhaxi Duoji. Again, the order in which the candidates were presented in the payoff matrix (first Li Hanmin, second Zhaxi Duoji) was kept constant throughout the experiment and there was no restriction as to how much time subjects could take to cast their votes. As with the Baseline Treatment, we conducted three sessions with 12 subjects each for a total of 36 subjects in this treatment. Again, in each session half of the subjects were Tibetan and half were Han Chinese. Subjects were matched into groups of 4, with 2 Tibetans and 2 Han in each group. Han Chinese sat in one room, while the Tibetan students sat in a different room. Tibetan subjects were assigned to receive higher instrumental payoffs if Zhaxi Duoji was elected (type $b$'s) and Han Chinese were assigned to receive higher instrumental payoffs if Li Hanmin was elected (type $a$'s). As above, subjects initially played the game for one period without communication, then repeated with the same random end point after the 10th round, using the same payment scheme. The Instructions for the Ethnic Treatment are presented in the Supplemental Online Appendix.

### II.3 Minimal versus Ethnic Identities in Voting without Repetition and Communication

We first consider the extent that voters in the two treatments, Baseline and Ethnic, are able to coordinate without repetition or communication. Voting behavior in these two treatments in the first period is summarized in Table 3 below. In the first period of the experiment subjects were not allowed to communicate and had no prior experience with the voting game. First, we find that identity voting is less than predicted by the mixed strategy equilibrium in the Baseline Treatment. Recall that the mixed strategy equilibrium predicted identity voting of 69% probability, we observe subjects voting their identities only 53% of the time, which is significantly different.[7]

[7] The probability of significance for a two-sided binomial test is 0.05.

| Table 3: Baseline & Ethnic Treatments Votes Period 1 | | | | | | |
|---|---|---|---|---|---|---|
| | Baseline Treatment | | | Ethnic Treatment | | |
| | Vote Choice | | Total | Vote Choice | | Total |
| Subject Type | $A$ | $B$ | Obs. | Han | Tibetan | Obs. |
| $a$ or Han Chinese | 67% | 33% | 18 | 72% | 28% | 18 |
| $b$ or Tibetan | 61% | 39% | 18 | 22% | 78% | 18 |

The lower than predicted identity voting appears to reflect coordination on candidate $A$, which is arguably focal given that $A$ comes first in the alphabet. Previous work has found similar such coordination on the first listed candidate (Rietz (2008)). When we break the results down by subject type, we find that both voter types $a$ and $b$ are more likely to vote for $A$, the first listed candidate, than to vote for $B$; type $a$ voters vote for $A$ 67% of the time, while type $b$ voters vote for $A$ 55% of the time. When we examine group outcomes, we find that the prevalence of voting for $A$ appears to facilitate coordination. We find that 5 out of the 9 groups manage to coordinate on $A$, with all voters choosing $A$ in 2 of these groups. We find that one group coordinates on voting for $B$, with all voters choosing $B$, and only 3 groups do not manage coordination on either $A$ or $B$, resulting in tie elections.

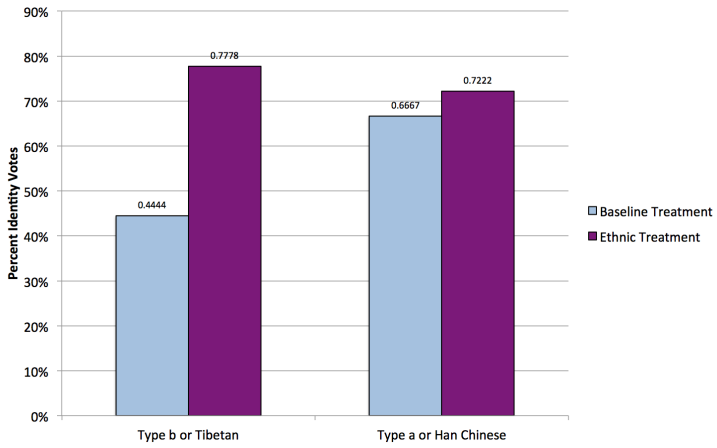
When we compare the Baseline Treatment to the Ethnic Treatment, we find that our naturally occurring ethnic identities are, as expected, more salient to our voters. Specifically, we find greater identity voting between the two treatments in period 1. In the Ethnic Treatment, subjects voted their identities 75% of the time, which while not significantly different from the predicted 69% probability in the mixed strategy equilibrium without expressive ethnic identity, it is significantly greater than the Baseline Treatment.[8] Furthermore, we find little evidence of coordination on the first listed candidate in the Ethnic Treatment. As shown in Figure 5 below, Tibetan voters are significantly more likely to vote for their co-ethnic (78%) in the Ethnic Treatment than comparable type $b$ voters whose first preference is also listed second are willing to vote for candidate $B$ (44%) in the Baseline Treatment.[9] We find that Han voters are also more likely to vote for their co-ethnic (72%) in the Ethnic Treatment than

[8] The binomial test probability of significance in a two-tailed test is 0.48. The $z$ statistic for the comparison between the Baseline and Ethnic Treatments is 1.93, Pr = 0.05.

[9] The z statistic for the comparison of proportions 2.05, Pr = 0.04 in a two-tailed test.

type $a$ voters are willing to vote for candidate $A$ (67%) in the Baseline Treatment, although these proportions are not significantly different. It is important to remember that although we observe greater ethnic voting by Tibetans than Han Chinese (which is even more remarkable given that the Tibetan candidate is listed second and the tendency to coordinate on the first listed candidate in the Baseline Treatment), we should not conclude that these results necessarily mean that Tibetan voters receive higher expressive identity utility than Han Chinese since the mixed strategy equilibrium would predict the opposite.

**Figure 5: Percent Identity Votes without Repetition or Communication**




Although we observe greater ethnic voting and less apparent coordination on the first listed candidate in the Ethnic Treatment, we actually find that there is little difference in the amount of overall coordination between the Baseline and Ethnic Treatments in period 1. Voters manage to coordinate a greater percentage of the time in the Ethnic Treatment than in the Baseline Treatment (78% or 7 out of 9 groups in the Ethnic Treatment versus 67% or 6 out of 9 groups in the Baseline Treatment), although the difference is insignificant. What is noticeable, though, is that the candidates benefitting from the coordination are clearly different in the two treatments. That is, in period 1 in the Baseline Treatment candidate $A$ wins 56% of the time (5 out of 9) and candidate $B$ wins only 11% of the time (1 out of 9), while in the Ethnic Treatment Li Hanmin wins 33% of the time (3 out of 9) and Zhaxi Duoji wins 44% of the time (4 out of 9), even

though Zhaxi Duoji is listed second.

The lack of a significant difference in coordination failures between the two treatments and the fact that we observe more coordination than is typical in one-shot battle of the sexes games without communication is likely because in our team or voting version of the game coordination takes only one defector from his or her identity. Nevertheless, the greater identity voting in the Ethnic Treatment is reflected in the fact that none of the groups in the Ethnic Treatment succeeded in full coordination on the same outcome, at the most one candidate received 3 votes. However, in the Baseline Treatment in 3 groups managed full coordination. Hence, full cooperation is a bit more likely under the Baseline Treatment than the Ethnic Treatment. This result fits with our theoretical analysis that full coordination equilibria do not exist when voters receive expressive identity utility and that such expressive identity utility is more likely to exist in the Ethnic Treatment than in the Baseline Treatment.

### II.4 The Effects of Communication and Repetition

In the succeeding rounds, subjects were able to engage in free-form communication prior to voting and engaged in repetition for at least 9 more periods, staying within the same groups. Voting behavior in these periods is summarized in Table 4 below and in Figure 6 which shows behavior over time. Subjects could not choose who to communicate with; all messages were sent to all subjects. Previous experimental results with minimal identities suggest that such communication and repetition within standing voting groups is likely to lead to coordination over time. Our interest is to determine if the identity effects found in the first period without experience or communication can be reduced to the same extent. We first examine the behavior of subjects in the Baseline and Ethnic Treatments in these rounds and then consider the communication transcripts.

| **Table 4: Baseline & Ethnic Treatments Votes Periods > 1** | | | | | | |
|---|---|---|---|---|---|---|
| | Baseline Treatment | | | Ethnic Treatment | | |
| | Vote Choice | | Total | Vote Choice | | Total |
| Subject Type | *A* | *B* | Obs. | Han | Tibetan | Obs. |
| *a* or Han Chinese | 60% | 40% | 162* | 50% | 50% | 204* |
| *b* or Tibetan | 51% | 49% | 162* | 43% | 57% | 204* |
| *Random draw determined end of experiment. | | | | | | |

We find evidence that communication and repetition is as effective with our naturally occurring identities as it is with minimal identities. Specifically, we find that overall that with communication and repetition the degree of identity voting is not significantly between the two treatments (54.63% of voters choose their identity in the Baseline Treatment and 53.43% in the Ethnic Treatment).[10] We do find that there are significant differences when we disaggregate by voter type. Specifically, we find that Han Chinese subjects in the Ethnic Treatment are significantly less likely to vote their identity than type *a* voters in the Baseline Treatment (60% in the Baseline compared to 50% in the Ethnic Treatment) and Tibetan subjects in the Ethnic Treatment are in a one-tailed test significantly more likely to vote their identity than type *b* voters in the Baseline Treatment (49% in the Baseline compared to 57% in the Ethnic Treatment).[11] Nevertheless, these differences appear to disappear over time. When we restrict our comparisons to periods after period 5, we find no significant differences. Specifically, Han Chinese in the Ethnic Treatment vote their identity in virtually the same proportion as type *a* subjects in the Baseline (52% in the Baseline compared to 50% in the Ethnic Treatment) and Tibetans in the Ethnic Treatment are likewise similar to type *b* subjects in the Baseline Treatment (49% in the Baseline compared to 52% in the Ethnic Treatment). Other breakpoints find similar results.

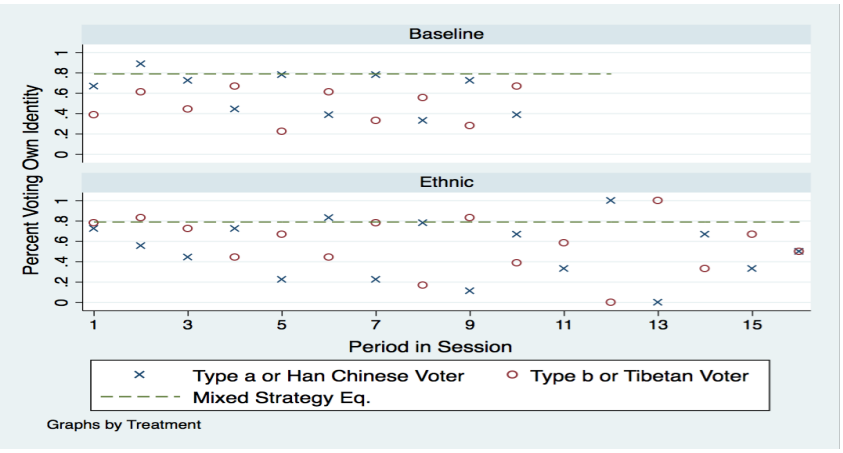
Figure 6 below shows voting behavior of the subjects over time. The vertical axes measures the percent voting own ethnicity while the horizontal axes measures the period in the experiment. Figure 6 nicely shows the alternating behavior we observe in the Baseline and Ethnic Treatments.

[10] The $z$ statistic for the comparison = 0.32, Pr = 0.75.

[11] The $z$ statistic for the first comparison is 2.10, Pr = 0.04 and 1.64, Pr = 0.05 in a one-tailed test, 0.10 in a two-tailed test.

Overall our results suggest that the naturally occurring ethnicities we used in our experiment were indeed salient as evidenced by the treatment effect when comparing the Baseline Treatment with the Ethnic Treatment in period 1

**Figure 6: Voting Behavior Over Time in Baseline & Ethnic Treatments**



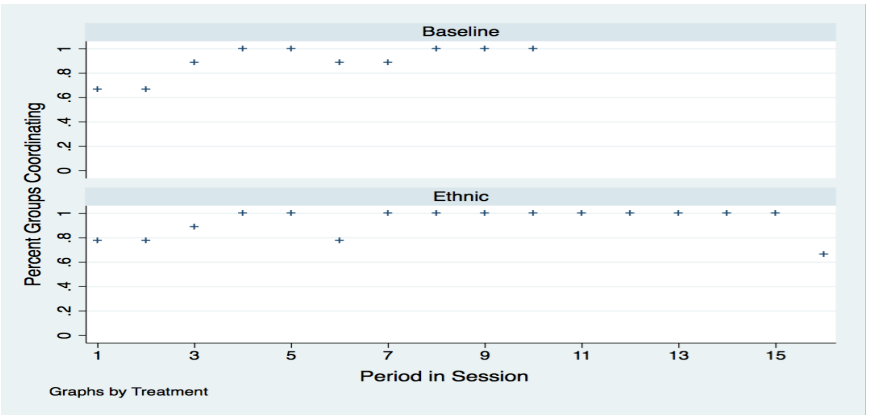

When we examine group outcomes, we find further support that communication and repetition lead to similar behavior in the Baseline and Ethnic Treatments. Group outcomes in periods with communication are presented in Table 5 below. We find that in the Baseline Treatment, groups manage to coordinate 93% of the time and in the Ethnic Treatment 94% of the time, which are not significantly different.[12] Even more remarkable, we find that there are more groups who coordinate fully (all four voters choosing the same candidate) in the Ethnic Treatment than in the Baseline (83% compared to 73%), although the difference is not significant.[13] We find some evidence that there is greater coordination on the Tibetan candidate in the Ethnic Treatment than candidate $B$ in the Baseline Treatment (52% compared to 41%), although this difference is not significant and becomes less when we examine the later periods (50% compared to 47% for periods after period 5).[14] Figure 7 further demonstrates how group outcomes change over time with communication and repetition. As is clear, full coordination

[12] The $z$ statistic for the comparison equals 0.41, Pr = 0.68.
[13] The $z$ statistic for the comparison equals 0.99, Pr =0.32.
[14] The $z$ statistic for the comparison of all periods with communication equals 1.51, Pr = 0.13 and for periods after period 5 equals 0.35, Pr = 0.73.

occurs quickly and by the fourth period in both treatments.

| **Table 5: Group Outcomes Periods > 1 in Baseline & Ethnic Treatments** | | | | |
|---|---|---|---|---|
| | Outcome | | | Total |
| Treatment | Candidate $A$ or Han | Candidate $B$ or Tibetan | Tie | Obs. |
| Baseline | 52% | 41% | 7% | 81* |
| Ethnic | 42% | 52% | 6% | 102* |
| *Random draw determined end of experiment. | | | | |

**Figure 7: Group Coordination Over Time in Baseline & Ethnic Treatments**




We examine individual group behavior to determine how much groups appear to alternate between coordination outcomes or instead always coordinate the same way. We find that almost all groups engage in some alternating behavior across coordination equilibria with the three deviants suggesting a bias towards candidate $A$ in the Baseline Treatment and the Tibetan candidate in the Ethnic Treatment. Specifically, in the Baseline Treatment we find only one group which only coordinates on a single candidate winning in all periods, candidate $A$. All other groups engage in alternating behavior such that both candidates win roughly half the time. In the Ethnic Treatment we find that two groups coordinate more often on the Tibetan candidate than the Chinese (73% of the time for one group and 67% of the time for the other), with the remaining groups engaging in alternating behavior without clear advantages. This result is reflected in that the average votes by group for candidate $B$ (Tibetan candidate) in the Baseline (Ethnic) Treatment is 1.77 (2.13); but these averages are not significant.

In summary, then, we find strong evidence that repetition and communication is as effective in reducing non-cooperation with our naturally occurring identities as it is with minimal identities.

It is important to note that our results do not suggest that the voters do not receive expressive identity in the Ethnic Treatment. Our results from period 1 suggests that such utility exists and is significant. What our analysis shows is that communication and repetition are effective in reducing the negative influence such identities can have on cooperation.

Finally, what do our results imply about the relative salience of the two ethnic identities? Given that we find some slight bias towards the Tibetan candidate even with repetition and communication can we conclude that the Tibetan identity is more salient than the Han Chinese identity for our subjects? The results are extremely weak on this regard, but they are suggestive that for the Tibetan subjects identity utility is more salient. That is, our evidence is not supportive of the mixed strategy equilibria given the high degree of maintained coordination, so therefore the greater ethnic voting by Tibetans does suggest that this difference reflects greater salience, or perhaps Han Chinese belief in such salience.

### II.5 Analysis of Communication Transcripts

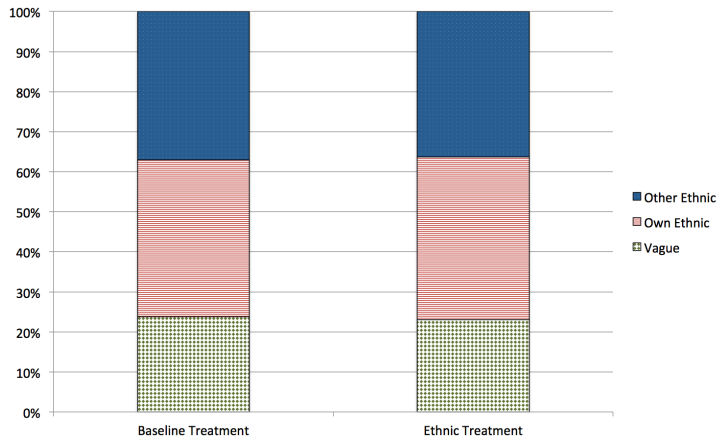
We coded the chat transcripts using subjects recruited in Shanghai at Jiao Tong University in an incentivized procedure described in Houser and Xiao (2011). That is, we brought in new subjects who first were told how the original voting game worked. Then the new subjects were asked to read the dialogues (which were ordered randomly and presented to them without any identifying information) and classify the intentions of the four players in each dialogue into one of the following categories: (1) vote for Hanmin Li (or $A$ in the Baseline Treatment); (2) vote for Zhaxi Duoji (or $B$ in the Baseline Treatment); (3) cooperate but no specific candidate intended; and (4) vague comment or unrelated to the game. Each coder was grouped with three others. If a subject's classification was consistent with the majority in his or her group (that is, at least one other subject classified a player's intention into the same category), the subject earned 1 Experimental Currency Unit, otherwise he or she earned zero. The exchange rate was 4 Experimental Currency Units to 1 RMB. The Instructions for this experiment are provided in the Supplemental Online Appendix. A different group of subjects coded the chats at the

group level using the same incentivized procedure; choosing whether the group agreed or not on a strategy and for which candidate they agreed to vote. Care was taken to recruit both Han Chinese and Tibetan subjects for the coding of the chats as although the chats were in Chinese characters and used Mandarin, it may be the case that Tibetan subjects use slang or other hidden language in communicating. We coded messages using a majority rule determination from these evaluations.

When we examine the individual messages we find no significant differences in the types of messages sent overall by treatment as illustrated in Figure 8 below and Table 6 below.[15] Not surprisingly, the majority of messages are voters stating that they will vote for their own identity candidate, 39% of the messages in the Baseline Treatment and 41% of the time in the Ethnic Treatment. When we disaggregate by subject type we find some slight evidence of identity effects for Tibetan subjects. That is, Tibetan subjects in the Ethnic Treatment send messages that they plan to vote their own identity 40% of the time and th ae other 32% of the time in the Ethnic Treatment while the percentages for type $b$ subjects in the Baseline Treatment are 32% and 43%, respectively. We find also that in both the Baseline and Ethnic Treatments type $b$ and Tibetan subjects send more vague messages than type $a$ and Han Chinese subjects (26% compared to 20%). However, none of these differences between subject types and treatments are significant. Hence, we find that the communications sent by voters in the two treatments are largely similar.

[15] The $\chi^2$ statistic for the comparison equals 0.17, Pr = 0.92. In coding the individual messages we coded an individual as voting either co-ethnic or other if the individual merely stated her intention to vote with the group and the group was coded by the majority of evaluaters as voting for her co-ethnic or other. When we code these observations as vague or merely agreement, we find as well no significant differences between the two treatments.

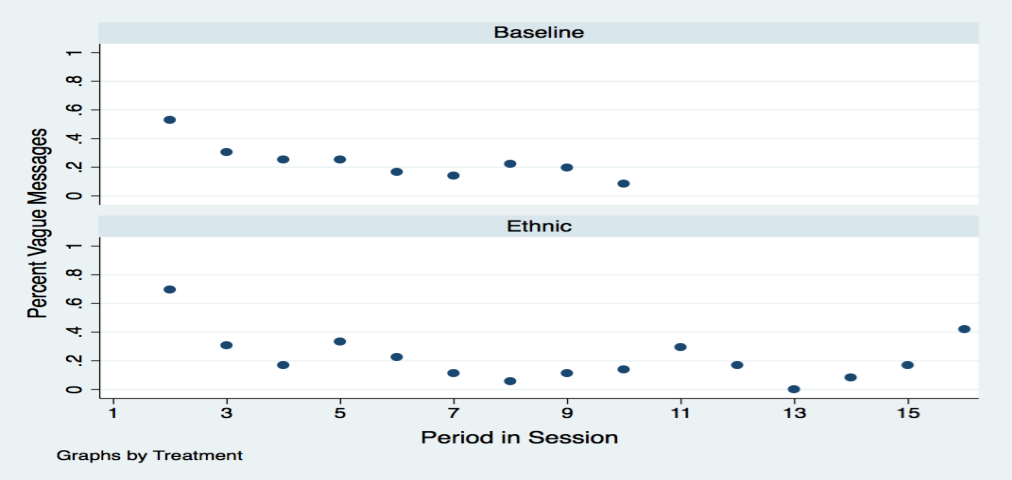
**Figure 8: Individual Messages in the Baseline & Ethnic Treatments**




| **Table 6: Communication in Baseline & Ethnic Treatments in Periods > 1** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Baseline Treatment | | | | Ethnic Treatment | | | |
| | Message Types | | | Total | Vote Choice | | | Total |
| Subject Type | *A* | *B* | Vague | Obs. | Han | Tibetan | Vague | Obs. |
| *a* or Han Chinese | 46% | 32% | 22% | 162* | 41% | 40% | 19% | 204* |
| *b* or Tibetan | 43% | 32% | 25% | 162* | 33% | 40% | 27% | 204* |
| *Random draw determined end of experiment | | | | | | | | |

Somewhat interesting is that the tendency to send vague messages decreases over time, as shown in Figure 9 below (except for the last period effect in the Ethnic Treatment). We see therefore that over time subjects increasingly use the chance to communication as a way to send informative messages in attempts to coordinate. Perhaps a more interesting question is to what extent are voters honest in their communications? Are voters reporting what they actually intend to do? When we examine only those subjects who stated how they intended to vote or that they agreed with a clear group decision on how to vote, we find that the vast majority follow through with their stated intentions (94%). We find no significant differences in this percentage by treatment (92% follow through in the Baseline Treatment and 95% in the Ethnic Treatment) and when we disaggregate by voter type. The evidence then suggests that the subjects largely use communication effectively in achieving the cooperation that we observe.

**Figure 9: Vague Messages Over Time in Baseline & Ethnic Treatments**




# III The Effects of Multiple Identities

In the analysis above we make two important findings: (1) naturally occurring identities in a situation without communication or prior experience can impede cooperation more than payoff relevant minimal identities and (2) communication and repetition can reduce these differences to be barely consequential, although there is some evidence that for Tibetan subjects identity utility has greater salience. In order to explore these identity effects more fully and to investigate the influence of multiple identities, we conducted two additional treatments (Ethnic Reinforcing Treatment and Ethnic Conflicting Treatment) in which we added naturally occurring identities that do not meet the criteria for ethnic identities in Chandra's work, discussed above, and therefore are arguably more malleable. Specifically, in these additional treatments our subjects also differed in another identity, that is, half with Arts and Humanities majors and half were Science majors. Such identities are a matter of choice and, while they certainly might also reflect innate abilities and perhaps long-standing preferences, they are arguably more flexible and less long-standing than the ethnic identities. Thus, they may not have the same salience in affecting coordination as ethnic identities.

The *Ethnic Reinforcing Treatment*, hereafter Reinforcing Treatment, was similar to the Ethnic Treatment with the addition that the Han students were all Liberal Arts majors (i.e. Arts

and Humanities, Chinese, media, etc.) and Li Hanmin was also described as an Liberal Arts Major. Similarly, all the Tibetan students were Science majors (i.e. "hard sciences" such as Chemistry, Biology, Physics) and Zhaxi Duoji was described as a Science major as well. As above, the order in which the candidates were presented was Han, then Tibetan and kept constant throughout the experiment and there was no restriction as to how much time subjects could take to cast their votes. As with the Baseline Treatment, we conducted three sessions with three groups each for a total number of 36 subjects and 9 groups in this Treatment.

The *Ethnic Conflicting Treatment*, hereafter Conflicting Treatment, was also similar to the Ethnic treatment with the addition that the Han students were all Liberal Arts majors and Li Hanmin was described as a Science Major. Similarly, all the Tibetan students were Science majors and Zhaxi Duoji was described as an Liberal Arts major. As above, the order in which the candidates were presented was Han, then Tibetan and kept constant throughout the experiment and there was no restriction as to how much time subjects could take to cast their votes. Again, we conducted three sessions with three groups each for a total of 36 subjects and 9 groups in this treatment as well.

We expect that without repetition and communication that reinforcing identities should increase the salience of expressive ethnic identity utility and lead to more ethnic voting and less coordination, while conflicting identities should have the opposite effect. However, repetition and communication should again help mitigate these differences.

### III.1 Multiple Identities and Coordination without Repetition and Communication

We begin our analysis of the effects of adding in the additional identities by comparing the behavior in the Reinforcing, Conflicting, and Ethnic Treatments in the first period when subjects had no prior experience and were not allowed to communicate prior to voting, as summarized in Table 7 below. We indeed find that, as expected, ethnic identity voting is higher in the Reinforcing Treatment (86%) and lower in the Conflicting Treatment (64%); recall that in the

Ethnic Treatment identity voting is 75%. The difference between the Reinforcing and Conflicting Treatments is significant, although the comparison of each with the Ethnic Treatment, arguably the more appropriate baseline, is not significant.[16]

| **Table 7: Reinforcing & Conflicting Treatments Votes Period 1** | | | | | | |
|---|---|---|---|---|---|---|
| | Reinforcing Treatment | | | Conflicting Treatment | | |
| | Vote Choice | | Total | Vote Choice | | Total |
| Subject Type | Han (Arts) | Tibetan (Science) | Obs. | Han (Science) | Tibetan (Arts) | Obs. |
| Han (Arts) | 83% | 17% | 18 | 67% | 33% | 18 |
| Tibetan (Science) | 11% | 89% | 18 | 39% | 61% | 18 |

When we disaggregate by subject type, we find that the difference between the Reinforcing and Conflicting Treatments is greater for Tibetan voters than for Han (in the Reinforcing Treatment Tibetans vote their ethnic identities 89% of the time while they do so 61% of the time in the Conflicting Treatment, the percentages are 83% and 67% for Han). The difference is also significant for Tibetans but not for Han.[17] However, as with the overall results, the percentages disaggregated are not significantly different from the percentages of ethnic voting by ethnicity in the Ethnic Treatment. Hence, we find weak evidence suggesting that the multiple identities increase the salience of the ethnic identities when reinforcing and decrease the salience when conflicting.

However, despite the weak evidence for differences in ethnic voting between these treatments and the Ethnic Treatment, we find that coordination failures are much more likely with multiple identities than without, even when Conflicting. In the Reinforcing Treatment only 4 out of the 9 groups manage to coordinate, a success rate of 44% and in the Conflicting Treatment only 1 out of the 9 groups manages to coordinate, a success rate of 11%, compared to a success rate of 78% (7 out of 9) in the Ethnic Treatment. The difference is not significant when comparing the Reinforcing Treatment with the Ethnic Treatment and but is when comparing the Conflicting

[16] The $z$ statistic for the comparison of the Reinforcing and Conflicting Treatments is 2.18, Pr = 0.03, for the comparison of the Reinforcing and Ethnic Treatments is 1.19, Pr = 0.23, and for the comparison of the Conflicting and Ethnic Treatments is 1.02, Pr = 0.31.

[17] The $z$ statistic for Tibetans is 1.92, Pr = 0.05, for Han is 1.15, Pr = 0.24.

Treatment with the Ethnic Treatment.[18] Although we expected the Conflicting Treatment to mitigate the effects of identity voting and lead to less coordination it appears that by adding in the confusion of conflicting identities, the treatment has the opposite effect, leading to much more difficulty in coordinating without repetition and communication.

### III.2 Multiple Identities and Coordination with Repetition and Communication

We now turn to the effects of repetition and communication on voter coordination in the Reinforcing and Conflicting Treatments. Table 8 summarizes behavior in these two treatments in the periods with communication and Figure 10 presents the percentage of ethnic voting over time in these treatments. Unlike our results comparing the Baseline and Ethnic Treatments, we find that when we compare the Reinforcing and Ethnic Treatments, ethnic voting is significantly higher in the Reinforcing Treatment with repetition and communication (62% compared to 53%).[19] Interestingly, the difference is significant only for Han Chinese. That is, in the Reinforcing Treatment Han Chinese vote their identity 66% of the time and only 50% of the time in the Ethnic Treatment while Tibetans vote their identity 59% of the time in the Reinforcing Treatment and 57% in the Ethnic Treatment.[20] The greater ethnic identity voting by Han Chinese appears to fall little over time, after the 5th period the Han ethnic voting of 64% in the Reinforcing Treatment compared to 50% in the Ethnic Treatment; differences which remain significant.[21] Even in period 10 and higher, ethnic identity voting for Han Chinese remains higher than in the Ethnic Treatment, although not significantly so (60% compared to 52%).

[18] The $z$ statistic for the comparison of the Reinforcing and Ethnic Treatments is 1.45, Pr = 0.15 and for the comparison of the Conflicting and Ethnic Treatments is 2.85, Pr = 0.00.

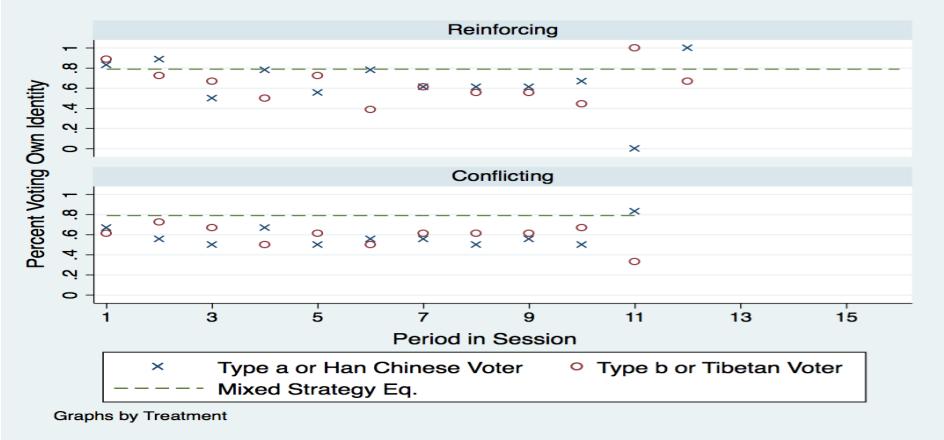
[19] The $z$ statistic for the comparison is 2.48, Pr = 0.01.

[20] The $z$ statistic for the comparison for Han Chinese is 3.13, Pr = 0.00 and for Tibetans 0.36, Pr = 0.72.

[21] The $z$ statistic for the comparison equals 2.10, Pr = 0.04.

| Table 8: Reinforcing & Conflicting Treatments Votes Periods > 1 | | | | | | |
|---|---|---|---|---|---|---|
| | Reinforcing Treatment | | | Conflicting Treatment | | |
| | Vote Choice | | Total | Vote Choice | | Total |
| Subject Type | Han (Arts) | Tibetan (Science) | Obs. | Han (Science) | Tibetan (Arts) | Obs. |
| Han (Arts) | 66% | 34% | 174* | 55% | 45% | 168* |
| Tibetan (Science) | 41% | 59% | 174* | 40% | 60% | 168* |
| *Random draw determined end of experiment. | | | | | | |

**Figure 10: Voting Behavior Over Time in Reinforcing & Conflicting Treatments**



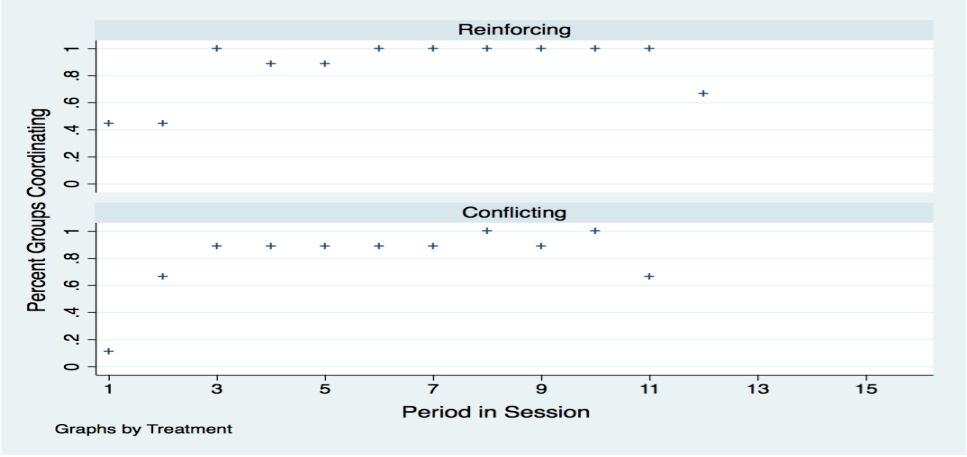

In contrast, we find no significant differences in ethnic identity voting between the Conflicting and Ethnic Treatments. This result is not surprising given that, as noted above, we find that ethnic identity voting is lower in the first period in the Conflicting Treatment and we know that in the Ethnic Treatment repetition and communication reduces ethnic identity voting.

What are the effects of repetition and communication on group coordination in these multi-identity treatments? We find that coordination is somewhat less successful in both the Reinforcing and Conflicting Treatments as compared to the Ethnic Treatment, but the differences are not significant (91% in the Reinforcing Treatment and 88% in the Conflicting Treatment as compared to 94% in the Ethnic Treatment). However, not surprisingly given the greater ethnic identity voting by Han Chinese in the Reinforcing Treatment, we find that when groups coordinate in the Reinforcing Treatment it is more likely to be in favor of the Han candidate than in the Ethnic Treatment (57% compared to 45%), a difference that is, however, not significant at

conventional levels.[22] We find no large differences when making the same comparison between the Conflicting and Ethnic Treatments (50% in the Reinforcing compared to 45%).

When we examine group behavior across periods, we find that as with the previous treatments, most groups engage in alternating behavior with three exceptions: one group in the Reinforcing Treatment and one group in the Conflicting Treatment always voted for the Han Chinese candidate and one group in the Conflicting Treatment always voted for the Tibetan candidate. Other groups tended to split the wins by the two candidates equally, although one group in the Conflicting Treatment ended up with tied outcomes the majority of the time. Figure 11 presents group coordination over time in these two treatments.

**Figure 11: Group Coordination Over Time in Reinforcing & Conflicting Treatments**




When we examine the chat transcripts we find that individuals are less likely to report an intention of voting contrary to their ethnic identity and more likely to provide a vague statement in both the Reinforcing and Conflicting Treatments as Compared to the Ethnic Treatment as illustrated in Figure 12 below. We find that subjects are quite truthful in revealing their intentions, when they do so, in the Reinforcing Treatment, following through with intentions 94% of the time. They are much less honest in the Conflicting Treatment where they follow stated

[22] The $z$ statistic for the comparison is 1.60, Pr = 0.11.

intentions only 85% of the time. Hence we find that subjects are less forthright in their communications with multiple identities. They communicate more vaguely in both the Reinforcing and Conflicting Treatments and less honestly in the Conflicting Treatment. Furthermore, unlike the Baseline and Ethnic Treatments, we find that vague messages do not decrease much over time as shown in Figure 13 below.

**Figure 12: Individual Messages in Reinforcing & Conflicting Treatments**

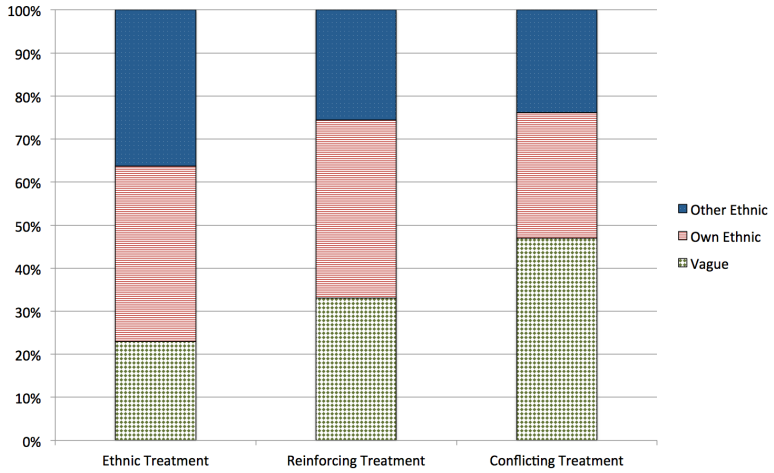
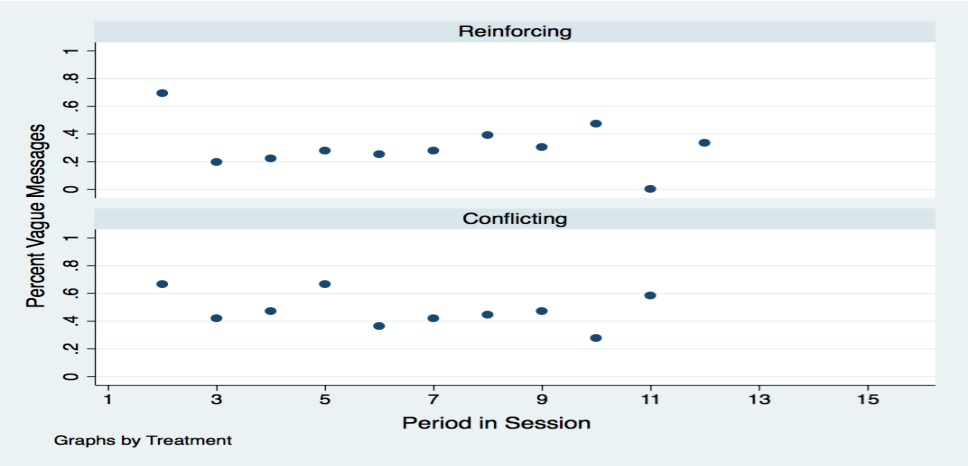



**Figure 13: Vague Messages Over Time in Reinforcing & Conflicting Treatments**




In summary, we find that Reinforcing and Conflicting identities are less easily overcome with repetition and communication than single ethnic identities or minimal group identities.

Communication is less informative. Reinforcing identities can be more resistant to these effects and appear to make the ethnic identities more salient, particularly the ethnic identity that appeared less salient in the Ethnic Treatment (Han Chinese). Conflicting identities, rather than mitigating the effects of ethnic identities, appear to add to confusion, which does not disappear with repetition and communication.

# IV Other-Regarding Behavior, Coordination, and Identities

In our simple voting game the two candidates only differ in the asymmetry in terms of winners and losers. In other ways there is little to distinguish them. In terms of aggregate payoffs both candidates provide equal total payoffs, 340 experimental points. The inequity between winners and losers is identical and both provide the same minimum payoffs to voters. Thus, if voters care about aggregate payoffs, equity between voters, or maximizing the minimum payoffs, the choices are identical. Previous research has demonstrated that voters might be willing to engage in other-regarding or prosocial voting for a candidate that is not their first choice when one of the choices differs on these dimensions.[23] Thus, in our experimental game we have limited the degree that one candidate may be focal to the candidate first listed, which we did find was important in the Baseline Treatment.

In order to compare a consider a possible stronger focal effect, we introduce a variation in our Baseline voting game which we label Other-Regarding Treatment, presented in Table 9 below. Again, subjects were randomly assigned to either type $a$ or type $b$ in which there were 2 voters of each type. In each period they voted for either candidate $A$ or candidate $B$ (abstention was not allowed). The payoffs received in experimental points are given by Table 3 below. We conducted two sessions with three groups each and one session with 2 groups for a total of 8 groups and 32 subjects in this treatment. Again, the order in which the candidates were presented in the payoff matrix (first $A$, second $B$) was kept constant throughout the experiment and there was no restriction as to how much time subjects could take to cast their votes. Note

[23] See Feddersen et al (2009).

that now candidate $B$ is the "other-regarding choice" in that total aggregate payoffs are higher if $B$ is selected, $B$ maximizes the smallest payoff, and the difference in payoffs between voters is minimized if $B$ is selected.

**Table 9: Other-Regarding Voting Game**

| | Election Outcome | | | Number |
|---|---|---|---|---|
| Voter Type | $A$ | $B$ | Tie | of Voters |
| $a$ | 100 | 90 | 0 | 2 |
| $b$ | 60 | 100 | 0 | 2 |

As in the Baseline voting game, when we assume no expressive identity utility, there are multiple coordination equilibria – equilibria in which voters coordinate on voting for $A$, either all four voters or three of the four, and equilibria in which voters coordinate on voting for $B$, again either all four voters or three of the four. There is also a symmetric mixed strategy equilibrium and correlated equilibria, which can be derived as above. Our expectation is that the coordination equilibrium in which all four, or less likely three, voters choose $B$ will be focal.

### IV.1 Effect of Other-Regarding Choice on Voter Coordination

As reported in Table 10 below, we find that in the initial period, without repetition or communication, voters appear strongly attracted to candidate $B$ as a focal choice, with 63% choosing candidate $B$ in the Other-Regarding Treatment significantly more than the 36% in the Baseline Treatment.[24] However, when we break down voting behavior by voter type, we find that the difference is only significant for type $b$ voters. That is, type $a$ voters choose $B$ 44% of the time in the Other-Regarding Treatment as compared to 33% in the Baseline, while type $b$ choose $B$ 81% of the time in the Other-Regarding Treatment as compared to 39% in the Baseline.[25] We find little difference in the percentage of groups who coordinate in the Other-Regarding Treatment (63% or 5 out of 8 groups) as compared to the Baseline Treatment (67% or 6 out of 9 groups). However, we find that the majority of groups who coordinated in the Other-Regarding Treatment coordinated on $B$ (4 out of 5), while the majority of groups who coordinated in the

[24] The $z$ statistic for the comparison is 2.17, Pr = 0.03.

[25] The $z$ statistic = 0.62, Pr = 0.53 for type $a$ voters and 2.51, Pr = 0.01 for type $b$ voters.

Baseline did so for $A$ (5 out of 6). Hence, we find strong evidence that the Other-Regarding Choice is focal and more so than being listed as the first candidate.

**Table 10: Other-Regarding Treatment Votes**

| | First Period | | | Periods > 1 | | |
|---|---|---|---|---|---|---|
| | Vote Choice | | Total | Vote Choice | | Total |
| Subject Type | $A$ | $B$ | Obs. | $A$ | $B$ | Obs. |
| $a$ | 56% | 44% | 16 | 19% | 81% | 150* |
| $b$ | 19% | 81% | 16 | 17% | 83% | 150* |
| *Random draw determined end of experiment. | | | | | | |

Recall that in the Baseline Treatment once we added in repetition and communication almost groups adopted an alternating equilibrium approach, such that both candidates were advantaged and the bias in voting for candidate $A$ was reduced. What happens when we have a choice that is other-regarding? We find strong evidence that groups coordinate on the equilibria in which they coordinate on candidate $B$ even with repetition and communication. In the Other-Regarding Treatment 82% of subjects voted for candidate $B$ in the periods with communication as compared to only 44% in the Baseline Treatment.[26] Unlike the first period, both types of subjects engage in significantly more voting for candidate $B$ in the Other-Regarding Treatment (for type $a$'s the comparison is 81% to 39% and for type $b$'s the comparison is 83% to 49%).[27] While we find no significant difference in coordination levels with communication and repetition between the Baseline and the Other-Regarding Treatment (97% coordinate in the Other-Regarding Treatment as compared to 93% in the Baseline), of those groups who coordinate, we find that 85% coordinate on candidate $B$ in the Other-Regarding Treatment as compared to only 44% in the Baseline, which is significantly different.[28] When we examine behavior by group across periods, we find that all groups coordinate on candidate $B$ for more periods (4 out of 8 groups for all periods) and only one group shows evidence of alternating behavior with 4 wins by $A$ and 5 wins by $B$.

We find communication is also different between the Baseline and Other-Regarding Treatments. That is, we find significantly more vague messages (35% compared to 24%) and less

[26] The $z$ statistic for the comparison equals 9.85, Pr = 0.00.
[27] The $z$ statistic = 7.52, Pr = 0.00 for type $a$'s and 6.41, Pr = 0.00 for type $b$'s.
[28] The $z$ statistic for the comparison is 5.19, Pr = 0.00.

informative messages both regarding voting one's identity and voting contrary to one's identity.[29] However, we find little evidence that subjects are not stating their honest intentions as we found in the Conflicting Treatment, 90% of voters who stated an intention followed through. The evidence suggests that communication was more vague because it was less necessary. Because voters so overwhelming coordinated on candidate $B$, there was little need to communicate. There was greater need in the Baseline Treatment when communication helped facilitate the largely alternating equilibria strategies we observe. This effect is particularly noteworthy if we focus on the periods after period 5. In the Baseline Treatment only 16% of messages are vague, while in the Other-Regarding Treatment 42% are.

In summary we find that having a choice that is arguably Other-Regarding facilitates coordination strongly, particularly with communication and repetition. Other-Regarding choices are more focal than those first listed and groups find it more easy to do so, so much so that communication becomes less necessary over time.

### IV.2 Identities and Other-Regarding Choices

Given that having an other-regarding choice as an option leads to extremely easy coordination among voters, what happens when we introduce naturally occurring ethnic identities? Will such identities mitigate the advantage reaped by the other-regarding choice? In order to address this question we conducted a sixth treatment, Ethnic Other-Regarding, in which we used the same procedures and experimental design as in the Ethnical Treatment but with the payoff matrix in the Other-Regarding Treatment. Therefore, the Tibetan candidate became the other-regarding choice. We conducted two sessions with three groups of 4 subjects and one session with 2 groups of 4 subjects for a total of 8 groups and 32 subjects.

The voting behavior in the Ethnical Other-Regarding Treatment is reported on in Table 11 below. In the initial period without repetition and communication we find less voting overall for the Tibetan candidate in the Ethnical Other-Regarding Treatment than in the Other-Regarding

[29] The $\chi^2$ statistic for the comparison equals 9.89, Pr = 0.07.

Treatment (50% compared to 63%), but the difference is not significant. However, when we disaggregate the data in period 1 we find strong identity effects. Specifically, Han Chinese vote significantly less for the Tibetan candidate in the Ethnic Other-Regarding Treatment than type $a$ voters chose the $B$ candidate in the Other-Regarding Treatment (13% as compared to 44%), while we find no significant difference between Tibetan voters and type $b$ voters (88% to 81% voting for the Tibetan and $B$ candidates, respectively).[30] The result is a serious inability to coordinate in the first period in the Ethnic Other-Regarding Treatment, only 2 out of the 8 groups coordinate (in both cases the coordination occurred with a minimal winning coalition, in one group for the Tibetan candidate and the other for the Chinese) as compared to 5 out of the 8 groups in the Other-Regarding Treatment, a difference that is not significant at conventional levels. The addition of ethnic identities appears to strongly affect the Han Chinese subjects and make them less willing to coordinate.

**Table 11: Ethnic Other-Regarding Treatment Votes**

| | First Period | | | Periods > 1 | | |
|---|---|---|---|---|---|---|
| | Vote Choice | | Total | Vote Choice | | Total |
| Subject Type | Han | Tibetan | Obs. | Han | Tibetan | Obs. |
| Han | 88%** | 13%** | 16 | 27% | 73% | 156* |
| Tibetan | 13%** | 88%** | 16 | 19% | 81% | 156* |
| *Random draw determined end of experiment. | | | | | | |
| **Percentages sum to greater than 100 due to rounding | | | | | | |

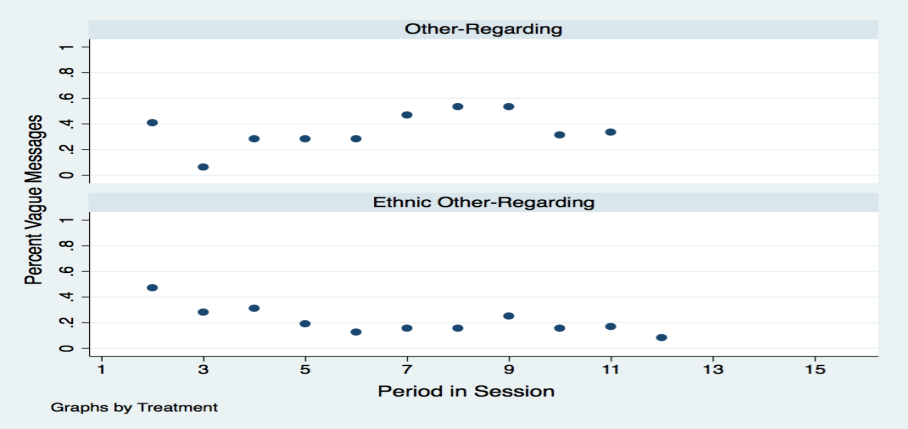
What happens once subjects are able to engage in repetition and communication? We find that repetition and communication have strong effects on behavior in the Ethnic Other-Regarding Treatment. Figure 14 presents voter behavior over time in both the Other-Regarding and the Ethnic Other-Regarding Treatments. Specifically, we find that voters coordinate on the Tibetan candidate despite the ethnic identity divisions. Although Han Chinese vote for the Tibetan candidate still less than type $a$ voters choose $B$ in the Other-Regarding Treatment (73% compared to 81%), this difference is not significant and falls over time. As shown in Figure 15 which summarizes group coordination over time in these two treatments, we find that there are less coordination successes in the Ethnic Other-Regarding Treatment (86% compared to 97%),

[30] The $z$ statistic for the first comparison equals 1.97, Pr = 0.05 and for the second 0.49, Pr 0.63.

which is significant, but for periods after 5 is virtually identical (96% compared to 98%).[31] When we examine the outcomes when coordination occurs we find that 82% are wins for the Tibetan candidate and when we examine individual group behavior we find that the Tibetan candidate wins a majority of the time in all groups, and the only group where the number of wins are close to equal has more tie outcomes than wins by either candidate (although only one group coordinates 100% of the time on the Tibetan candidate).

**Figure 14: Voter Behavior Over Time in Two Other-Regarding Treatments**


**Figure 15: Group Coordination Over Time in Two Other-Regarding Treaments**




It is clear when we examine the chat transcripts that the subjects are using their communication opportunities to facilitate the increase in coordination we observe over time. In contrast

[31] The $z$ statistic for the first comparison is 2.54, Pr = 0.01 and 0.53, Pr = 0.60 for the second.

to the Other-Regarding Treatment, only 22% of the messages are vague as to intentions and for communications after period 5, only 16% are vague; percentages that are significantly different from the Other-Regarding Treatment.[32]

In summary, we find that naturally occurring ethnic identities can make coordination on an other-regarding choice difficult. However, repetition and communication can reduce the effects of identity and increase coordination on the other-regarding choice. Subjects clearly use the communications to increase coordination and appear to succeed.

# V Summation of Treatment Results

We have presented findings from six different treatments, with variations in the degree of identity salience and focality of the choices. We also have presented data on choices made initially without communication or repetition and then examined the effects of communication and repetition on long run behavior. Overall our results suggest that the naturally occurring ethnicities we used in our experiment were indeed salient as evidenced by the treatment effect when comparing the Baseline Treatment with the Ethnic Treatment in period 1 and when comparing the two Other-Regarding Treatments in period 1. We also found that to a large extent repetition and communication works to reduce these divisions, even when these divisions are strongly reinforced by other identities. Multiple identities appear to be the most difficult to overcome, but over time, we see that subjects achieve greater coordination through communication.

# VI Concluding Remarks

As noted in the Introduction, voter coordination is necessary in many situations in which one group of voters must acquiese to another in order to prevent a third option which both groups dislike. Yet, it is well known that such coordination can be difficult. It is also often argued that ethnic and other group identities can prevent voters from achieving coordination leading to

[32] The $\chi^2$ statistic for all the comparison of all the periods with communication 12.36, Pr = 0.00 and for the periods after period 5, 28.84, Pr = 0.00.

outcomes that are least desired by the majority. It is an important question then whether such identities can and do reduce the ability of voters to coordinate and what factors might overcome any negative effects.

Most previous research has examined the effects of identity on voter coordination using the minimal identities that can be assigned in the laboratory exogenously. In this paper we have examined the effects of minimal and naturally occurring identities on voter coordination. We find that naturally occurring identities can have stronger negative effects on the ability of groups to coordinate than minimal identities, even when one choice is clearly focal as in the case with a choice that is arguably more other-regarding. However, repetition and communication help groups significantly overcome their divisions by identity and facilitate group coordination. We also find that when one choice is clearly more focal than the other, as in our other-regarding choice, voters find it easy to coordinate on a common outcome even in the face of natural ethnic divisions. We find that repetition and communication are least successful in helping voters coordinate when they are confronted with multiple conflicting identities and that groups find it most difficult to coordinate in that situation.

While our experiments are conducted in a laboratory environment, providing us with the ability to control the choices before voters and their payoffs, we combine our laboratory methods with the use of naturally occurring and highly salient ethnic identities in our study. This allows us to have both the control of the laboratory and the ecological validity of the naturally occurring identities. We also allow for subjects to engage in free form communication which provides us with greater insight into how successful such communication can be in facilitating cooperation.

Our results are largely good news for concerns about the possible negative effects of ethnic identities on coordination among voters. That is, our results suggest that voters are willing to use communication to coordinate when faced with that necessity and can do so successfully. However, our results suggest problems for groups that have little experience with prior coordination and little opportunity for communication. Our results also suggest that multiple identities,

when they are conflicting, can be serious impediments to coordination, even when repetition and communication are possible.

# VII References

## References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# Supplemental Online Appendix

## Instructions for Ethnic Treatment (English Translation)

You are about to participate in a decision making experiment. Please turn off your cell phone and do not talk to other participants. During the experiment, all interaction with other participants will be conducted via the computers. If you have any questions, please raise your hand, and the experimenter will come to answer your question. Any participant who violates the stated rules will be asked to leave the experiment and forfeit all accrued earnings.

Your earnings from the experiment will depend on your decisions as well as those of other participants in your group. The decisions that you make during the experiment will be kept anonymous to other participants. Likewise, you will not know the personal identities of other participants in the experiment.

In the experiment, your earnings will be calculated using experimental currency units. At the end of the experiment, your earned experimental currency units will be converted to RMB at an exchange rate of 3 experimental currency units = RMB 1, and be paid to you in cash.

At the beginning of the experiment, you will be randomly matched with three other participants to form a group of two Han students and two Tibetan students. The experiment will have ten identical rounds first, and after the tenth round, there is a 30% probability that there will be a next round and there is a 70% probability that the experiment will end. Once a group is formed, the group members will remain the same for all subsequent rounds. That is, you will play with the same participants in the experiment.

There are two candidates and you will choose to vote for one. One candidate is a Han named Hanming Li, and the other candidate is a Tibetan named Zhaxi Duoji. Each participant could only vote for one candidate. The candidate who has three or more votes will be elected. If no candidate has three or more votes, then neither candidate is elected.

Your earnings will be determined by the following rules:

To a Han participant (there are two Han participants in a group), if Hanming Li gets elected,

you will earn 100 experimental currency units. If Zhaxi Duoji gets elected, you will earn 70 experimental currency units. If neither candidate gets elected, you will earn 0 experimental currency units.

To a Tibetan participant (there are two Tibetan participants in a group), if Hanming Li gets elected, you will earn 70 experimental currency units. If Zhaxi Duoji gets elected, you will earn 100 experimental currency units. If neither candidate gets elected, you will earn 0 experimental currency units.

Please note that your final earning will be 50% of your earnings in the first round, and 50% of your earnings in a randomly selected subsequent round. Besides, you will also earn a show up fee of RMB 5. So your total earnings will be RMB 5 plus your earnings in the experiment.

**Instructions for Communication Transcript Codings (English Translation)**

Welcome to our experiment!

You have already earned RMB 5 for your participation.

We have previously conducted a series of experiments where four players voted on two candidates. Now please read the instructions of this experiment carefully.

(Now give the subjects 5 minutes to read the instructions of the voting game)

In the experiment, the four players could communicate with each other via the computer screen before they voted. We have recorded their dialogues and ordered them randomly. You need to read these dialogues now and classify the intention of the four players in each of the dialogues into one of the following categories:

1) Vote for Hanmin Li (Chinese candidate)

2) Vote for Zhaxi Duoji (Tibetan candidate)

3) Cooperative but no specific candidate intended

4) Vague or unrelated to the game

Please note that the dialogues are randomly ordered and collected from different sessions.

Two other subjects participating in this experiment will read and classify the same dialogues

as you do. If your classification of a certain player is consistent with the majority in your group (that is, at least one of the other subjects classifies the player's intention into the same category as you do), you will earn 1 experimental currency unit; otherwise, you will earn zero. Therefore, you can earn up to 4 experimental currency units from each dialogue because there were four subjects participating in one dialogue.

The experimental currency units that you earn will accumulate through the dialogues you read and be converted to RMB at the exchange rate of 4 experimental currency = 1 RMB at the end of the experiment.