Group identity effects on individual decision-making

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DOCTORAL THESIS

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To my family and friends

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Table of contents

x

List of figures

List of tables

Abstract

As individuals, we define our group identities by categorizing others and ourselves into many social categories like gender, race, religion, nationality, political convictions, and profession, among many others. This categorization process confers us a notion of "who" we are, which social groups we belong, and more importantly, how we are expected to behave. This thesis revolves around two phenomena at the core of group identity literature; discrimination and intergroup conflicts. Group identity is considered an underlying factor of discriminatory behaviors and the emergence of conflicts between members of social groups. There is extensive evidence showing that the mere categorization into social categories is enough to trigger discrimination against members of other social groups. Moreover, human history provides many examples of conflicts and genocides rooted in group identity diversity more than in economic disputes. However, not all social group members discriminate in the same magnitude, nor all social groups are involved in conflicts. The first paper of this thesis proposes an empirical measure that goes beyond categorizing individuals into social categories. Using willingness to acquire representative goods of social groups, this paper measures and quantify group identity intensity to investigate reinforcing and attenuating factors of group identity. The results found provide evidence on how convergence and divergence in behaviors among social group members reinforce and attenuate the group identity intensity of individuals, which is crucial in predicting the emergence of intergroup conflicts at the collective level and strong degrees of discrimination at the individual level. The literature studying the effects of group identity on individual decision-making has largely focused on studying discrimination and intergroup conflicts assuming individuals' group identity is known and observable. However, many group identities rely on convictions and beliefs that are not directly observable from individual physical traits, and therefore, might be uncertain (e.g. religion, ideology). The second paper presented in this thesis explores the effects of group identity uncertainty on discrimination patterns when individuals decide whom to interact with and its repercussions on collective coordination efficiency. Managing group identity diversity and uncertainty is a major factor in determining organizations and firms' profit and success, especially when a diverse workforce might find it difficult to coordinate and cooperate. The results found in the second paper shed light on the role group identity uncertainty plays in individual interaction preferences and offer several

managerial insights for deterring discrimination among employees to interact and increase their coordination efficiency when working in teams. Finally, the last paper presented in this thesis, contributes to the literature of policies and interventions aimed at mitigating discrimination and prejudices between members of social groups in conflict. While this literature has focused on studying how the contact between members of different social groups reduces discrimination and prejudices, there is a lack of evidence on interventions with same purposes not requiring contact between individuals. The last paper presented in this thesis exploits a natural occurring context in which individuals of two social groups currently in conflict see themselves forced to cooperate in order to achieve a superordinate common goal without being able to get in contact. This context offers the opportunity to put the emphasis not in the contact between individuals but in the superordinate common goals as a mitigating factor of discrimination. Results show that individuals got more selfish as the superordinate common goal was gradually achieved. Furthermore, individuals from one social group also increased their discrimination as the common goal was gradually achieved. These results highlight superordinate common goals mitigate discrimination and selfishness.

1
Introduction

1.1. Overview

Identity Economics departs from concepts traditionally studied in other social sciences like Psychology and Social Psychology to incorporate the notion of *identity* into economic models and analysis. After the pioneering work of Akerlof and Kranton (2000), a growing literature on the economics of identity has studied and documented group identity effects on a wide range of individual decision-making and its implications in many economic and social contexts. One of the prominent issues addressed within this literature is the causes and consequences of discriminatory behaviors based on group identity. On the other hand, some researcher had also focused on studying how to effectively manage group identity diversity to reduce discrimination between individuals and avoid its negative social and economic consequences. The main goals of this thesis are to deepen on the triggers of discrimination and investigate how discriminatory behaviors between individuals with different group identity, especially between individuals of social groups in conflict, can attenuate.

To begin with, this thesis examines how individual group identity fluctuates as a result of comparing own behaviors with that of other social group members. Although theory models assume group identity reinforces when members of a social group align their behaviors and devaluates when there are divergences, such fluctuations on group identity have not been estimated and quantified yet. A natural question then is whether convergence in behaviors among individuals with the same group identity reinforces their group identity as much as it is devalued when their behaviors diverge. Using a laboratory-in-the-field experiment in which the group identity of participants is empirically measured and quantified, I found that acting like other social group members is what most participants react to and increase their group identity twice than when it reduces as a consequence of acting differently than other social group members.

Next, this thesis investigates the effects of group identity uncertainty on discrimination patterns, and how the effects of group identity on individual interaction preferences interrelate with potential economic incentives. Although some group identities like gender or ethnicity are observable from individual physical traits, many others like religion or ideology are not. Despite the attention devoted to studying discrimination between individuals that categorize each other into the same or different group identity, less attention has been paid to studying how individuals whose group identity is uncertain discriminate against each other. Are those individuals whose group

identity is uncertain discriminated against more than those individuals with different group identity? Using a laboratory experiment, I find that it depends on the time horizon. Concretely, results show individuals with a different group identity are discriminated against more than individuals whose group identity is uncertain in the short term. In contrast, individuals whose group identity is uncertain are discriminated against more than individuals with different group identity in the long term. Results found in this experiment also show that high economic incentives to interact with other participants are an effective tool to make discrimination patterns on individual interaction preferences disappear.

Finally, this thesis explores the role superordinate common goals among individuals have in deterring discrimination between members of different social groups, some of them currently involved in a conflict. There is extensive evidence showing that under certain conditions, interactions among individuals with different group identity are effective on reducing discriminatory behaviors among them. For instance, it has been shown that the mere contact in a neutral frame between individuals might not be enough to reduce discrimination, whereas interactions requiring cooperation among individuals to achieve a superordinate common goal have been proved to be very effective on reducing discriminatory behaviors. However, it is possible to reduce discrimination among individuals from different social groups if they do not interact? Would superordinate common goals not requiring contact between individuals able to mitigate discrimination? Results found in an online experiment highlight superordinate goals as a mitigating factor of discriminatory behaviors between individuals with different group identity, but not between individuals from social groups in conflict.

1.2. Group identity formation

Group identity, also known as social identity, is defined as the individual's sense of belonging to social groups. The Social Identity Theory developed by Tajfel and Turner (1979, 1985), together with its extension, the Self-Categorization Theory (Turner et al., 1987), describe the reflexive process through which individuals form their group identities.[1] These theories refer to groups of people that have a particular

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[1] See McCall and Simmons (1978) for an alternative theory of identity formation based on the roles individuals adopt within the society.

physical or psychological attribute in common as social groups. Social groups distinguish and classify individuals in regards a wide array of social categories like ethnicity, race, religion, nationality, gender, ideology, occupation, sexual orientation, or language, among many others. According to these theories, individuals' group identity formation mostly relies on social categorization, identification, and social comparison.[2] First individuals categorize other individuals and themselves into social groups of many social categories according to their physical attributes, belief, and convictions (e.g., ethnic categorization relies on physical attributes, whereas religious categorization relies on belief and behaviors). Thereafter, individuals perceive themselves as members of several social groups and identify with other social group members. As a result, other individuals in a same social group are categorized as in-group and individuals in different social groups as out-group. Once individuals have formed their group identities and developed a sense of belongingness to social groups, individuals increase their self-esteem through positive distinctiveness. Positive distinctiveness refers to social comparisons that accentuate the perceived similarities with the in-groups and the perceived differences with the out-groups in those dimensions in which the in-groups are judged more positively than the out-groups (Hogg and Abrams, 1988). These social comparisons at the group level can serve as a mechanism to simplify and process information and usually lead individuals to form generalized opinions, beliefs, and expectations about members of a particular social group, which are known as stereotypes (Oakes et al., 1994).

Categorizing others and oneself into social groups confers individuals a notion of "who" they are in the society, which social groups they belong to, and more importantly, how they are expected to behave. Social groups use to differentiate from each other not only by the attributes of its members, but also by how they members behave. Members of different social groups might hold different beliefs about appropriate and inappropriate behaviors in particular social contexts. In accordance with these beliefs, social groups establish "social norms" that prescribe how their members *should* and *should not* behave in different contexts (Sherif, 1936; Elster, 1989; Lapinski and Rimal, 2005; Bicchieri and Muldoon, 2011; Bicchieri and Mercier, 2014). When individuals adhere to social groups, they must conform and follow social norms to preserve the social group cohesion and reputation (Cialdini and Trost, 1998). When a

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[2] Often, group identity can also emerge from perceptions of shared goals and fates with other individuals (Lewin, 1948).

group member transgress a social norm, group members might try to repress the inappropriate behavior, punish the transgressor, or ultimately, expulse the transgressor from the group in order to restore the *identity* and *status* of the social group and its members.

Although group identity has been one of the main topics at the core of Psychology and Social Psychology literature, it has not been until recently that the notion of group identity has awakened the research interest of economists. The pioneer and seminal economic model proposed by Akerlof and Kranton (2000) introduces the notion of group identity into the utility function of individuals and define the "gains" and "losses" in utility experienced by individuals when following or transgressing a social group prescription (social norm). The identity-based utility function of individuals they proposed assumes that individuals following the social group prescriptions affirm and reinforce their group identity obtaining a utility "gain." In contrast, individuals deviating from prescribed behaviors by the social group devaluate their group identity and cause a "loss" in utility to themselves and to the other social group members. Furthermore, the model states that in the case of transgressing a prescription, the magnitude of individual and collective "losses" in utility will determine when social group members will react to the transgression, even incurring a cost, to modify the behavior of the transgressor.[3]

However, there are some interesting questions to which the model developed by Akerlof and Kranton (2000) does not provide specifications. For instance, are the "gains" in utility derived from following a particular prescription higher than the "losses" derived from not follow it? Are utility "gains" and "losses" context dependent? That is, does deviating from a particular prescription in a social context, like not going to pray at church on Sunday, cause the same "loss" in utility than deviating from it in an individual context like not praying at home before going to sleep? Do the answers to these questions generalize to most social groups? Answering these questions will provide a better understanding of individual preferences and behaviors and contribute to enriching the identity-based analysis aimed at tackling intergroup conflicts, secessionist political movements, discriminatory behaviors, and the formation of stereotypes.

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[3] There is literature in Economics showing punishments are effective on deterring free-riding and sustaining cooperation in public good contexts. See Chaudhuri (2011) for a review of that literature. Although the "social norm" notion used in this literature is not established by a particular social group, the operating mechanism of punishments in public good contexts is similar to the reactions to of social group members to the transgressors of social group prescriptions defined in Akerlof and Kranton (2000).

Chapter 2 of this thesis presents a lab-in-the-field experiment aimed at investigating the extent to which converging and diverging behaviors among social group members reinforce and attenuate group identity. The experiment was conducted in three Catalan-Spanish-Speaking regions. The group identity of participants was empirically measured through their willingness to acquire goods with representative attributes of social groups. The good used to measure individual group identity was the Catalan and Spanish translation of a book. To assess the effect on participants' group identities derived from acting similar or different than other social group members, participants played two games during the experiment with the purpose to create a precedent in each participant about their own behavior that later on in the experiment will allow them to compare their own behavior with those of other social group members. The results found quantify how much participants reinforce their group identity when realize they have acted like other social group members and how much they attenuate their group identity when realize they have acted different than other social group members. These results are of special interest for deepen into the reasons individuals increase or decrease their attachment to a particular group identity, which is a crucial factor in predicting the emergence of intergroup conflicts at the collective level and strong degrees of discrimination at the individual level.

1.3. Discrimination

The effects of group identity formation on individual decision-making extends beyond prescriptions and social norms established in social groups. Group identity also influences how individuals treat other individuals (even when there is not established by the social group a particular social norm or prescription about it). Sometimes, the mere categorization of individuals as in-group and out-group might lead individuals to differently behave depending on whether interact with members of the same or different social groups. This phenomenon is widely known as intergroup bias or discrimination (Tajfel et al., 1971; Brewer, 1979; Hewstone et al., 2002; Becker, 1957, 2010). Discrimination patterns can either be positive or negative.[4] The two most common

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[4] Economists also distinguish between two sources of discrimination, taste-based and statistical. Taste-based discrimination refers to discrimination patterns based on group identity categorization, whereas statistical discrimination refers to discriminatory behaviors that emerge in contexts of a lack or limited information that make individuals to be perceived and evaluated as a members of a particular social group instead of being evaluated by their own attributes and qualifications. See Guryan and Charles (2013) and

patterns of discrimination are in-group favoritism and out-group derogation. In-group favoritism refers to behaviors and decisions entailing a more favorable treatment of members of the same social group. In contrast, out-group derogation refers to behaviors and decisions treating members of other social group more unfavorably. Although it is less common, we can also find evidence of positive discrimination patterns against the out-groups, and negative discrimination patterns against the in-groups.

After the pioneer work of Akerlof and Kranton (2000), a growing literature on the economics of identity has documented group identity effects on a wide range of individual decision-making.[5] For instance, it has been found individuals tend to interact and associate more often with other individuals with whom sharing group identity, phenomena known as *homophily* (Lazarsfeld and Merton, 1954; McPherson et al., 2001; Currarini et al., 2009; Currarini et al., 2016; Kets and Sandroni, 2019), that might eventually result in segregation and has important implications in education decisions and outcomes (Calvó-Armengol et al., 2009; Echenique et al., 2006; Akerlof and Kranton, 2002), employment rates and salaries (Calvó-Armengol and Jackson, 2004; Patacchini and Zenou, 2012), and belief formation through information diffusion (Golub and Jackson, 2012). Group identity also influences individual preferences for allocation and redistribution economic resources (Fowler and Kam, 2007; Ben-Ner et al., 2009; Klor and Shayo, 2010; Currarini and Mengel, 2016; Kranton et al., 2016; Kranton and Sanders, 2017), cooperation (Eckel and Grossman 2005; Goette et al., 2006; Ruffle and Sosis, 2006; McLeish and Oxoby, 2007, Charness et al., 2014) and coordination among individuals (Chen and Li, 2011; Goyal et al., 2020), punishment and reward behaviors (Bernhard et al., 2006; Chen and Li, 2009; Currarini and Mengel, 2016), and pro-social behaviors like charitable giving (Kessler and Milkman 2018; Charness and Holder, 2019).

One of the main research lines within this literature addresses the effects and repercussion of group identity within firms and organizations. As pointed out by Ashforth and Mael (1989), Haslam (2004), and Akerlof and Kranton (2005, 2010), inculcating a common organizational group identity to individuals is a major factor for both individuals' motivation and satisfaction in their jobs as well as for firms and organizations success and profits. Specially, when the workforce is diverse and

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Lang and Lehmann (2012) for a reviews and discussions of empirical and theoretical work, respectively, in the economics of discrimination.

[5] See Charness and Chen (2020) for a literature review on the effects of group identity on individual decision-making.

8

employees from different cultural, religious, professional, and linguistic backgrounds might found difficulties or to be reluctant to cooperate, coordinate, and trust each other when working in teams (Hjort, 2014).

Akerlof and Kranton (2005) developed a theoretical model to study how economic incentives at work interrelate with workers organizational identity. The model establishes two different employees' social categories, *insider* and *outsider*. The *insider* employees are those employees that share the organization's mission and values, and therefore, their goals at work are aligned with those of the organization. In contrast, the *outsider* employees do not feel identified with the organization's mission and values, and their main motivation at work are the economic incentives they receive. In other words, the utility that *outsider* employees obtain from their jobs is the positive utility they derive from their salary minus the disutility of the effort they are required to exert at work, and therefore, they will always try to minimize their efforts in the workplace. *Insider* employees on the other hand, derive positive utility form the mere fact to work in an organization they feel identified with, which implies that *insider* employees will demand a lower salary and exert a high effort at workplace than *outsider* employees.[6]

A common organizational group identity can also play a major role in determining workgroups efficiency and productivity. There is empirical and experimental evidence that workgroup members reach better outcomes and productivity when they perceive themselves as in-group or members of the same social group since their willingness to cooperate, coordinate, and trust each other, increase. For instance, Goette et al. (2006) provides unmistakable evidence that sharing group identity promotes cooperation among individuals. Authors exploit the random assignation of individuals to different platoons in the Swiss Army to study cooperative behaviors in a simultaneous Prisoner's Dilemma between individuals who were assigned either to the same or different platoon. Results show cooperation rates are significantly higher in interactions between members of the same platoon as compared to in interactions between members of different platoon. Similar results have been found in laboratory experiments where participants play cooperative strategic games. Charness et al. (2007) found that participants tend to cooperate more in the Prisoner's Dilemma and the Battle of the Sexes games when participants play the games with other participants with same group identity. Eckel and Grossman (2005), Ruffle and Sosis (2006) and Charness et al.

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[6] Similarly, Besley and Ghatak (2003, 2005) and Prendergast (2007) argue that worker motivation and effort are higher when their preferences are aligned to the organization mission and values.

(2014) also found evidence that sharing group identity can promote cooperation amongst individuals in Public Good Game settings.

Also coordination is crucial in determining workgroups performance, specially, in joint production processes in which the lower performer in the team determines the overall outcome of the workgroup. Coordination games with multiple Nash equilibria, also known as Weakest-Link Games and Minimum-Effort Games (Van Huyk et al., 1990), have been used to study coordination efficiency in such joint production contexts. There is evidence that inculcating a common group identity is an effective mechanism through which firms can avoid workgroup members end up systematically providing the minimum effort.[7] In Chen and Chen (2011), experimental participants play 50 rounds of the Minimum-Effort Game with a different participant each round (random matching protocol). In the in-group treatments participants play the game with in-group participants, whereas in the out-group treatments participants play the game with out-group participants. Results show that group identity significantly affects participants' effort decisions. In all experimental sessions in which participants must coordinate their efforts with other in-group participants, effort decisions converge to the highest effort level and thereby increase coordination efficiency. In contrast, the average effort level provided by participants when playing with out-group participants remains very low along rounds, resulting in workgroups where providing the minimum effort level is the norm.

Trust also plays a determinant role within organizations and commitment among workgroup members (Mayer et al., 1995; Jones and George, 1998; Dirks and Ferrin, 2001). There is also extensive experimental evidence using the Trust Game showing that individuals trust other individuals with same group identity more than individuals with different group identity (Glaeser et al., 2000; Fershtman and Gneezy, 2001; Heap and Zizzo, 2009; Guillen and Ji, 2011; Binzel and Fehr, 2013).

To summarize, there is evidence pointing out that a common organizational group identity increase individuals commitment to organizations and firms, and can boosts cooperation, coordination and trust in workgroup settings.

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[7] Other factors that have been proved to contribute solving coordination problems and improve coordination efficiency are communication (Cooper et al., 1992; Brandts and Cooper, 2007; Blume and Ortmann, 2007), group competition (Bornstein et al., 2002), economic incentives (Brandts and Cooper, 2006), precedents of successful coordination (Webber, 2006), and endogenous group formation (Riedl et al., 2016; Goyal et al., 2020).

However, individuals might care about other group identities from those instilled in the workplace. In particular, individuals might care about group identities based on belief and convictions (Golman et al., 2016) that are non-observable from individual physical traits, and therefore, might be uncertain. Despite the extensive evidence documenting group identity effects on individual decision-making and its repercussion at workplace, there is a lack of evidence on how group identity uncertainty affects individual's willingness to coordinate and its implications for managing group identity within firms and organizations. Deciding the extent to which employees know each other and its contexts may be crucial in determining their willingness to coordinate and cooperate, and consequently, their productivity.

Chapter 3 of this thesis presents a laboratory experiment designed to investigate the effects of group identity uncertainty on discrimination patterns when individuals decide whom to interact with and its repercussions on collective coordination efficiency. In this experiment participants are induced either to a *weak* or *strong* artificial group identity. Thereafter, participants play a Weakest-Link game in which must decide with whom to interact and coordinate regarding other participants who had been induced with the same group identity (in-group), participants who had been induced with different group identity (out-group), and participants that it is not known which group identity had been induced (unknown-group). This novel decision context including unknown-group individuals enables investigating the effects of group identity uncertainty on individual interaction preferences and willingness to coordinate, which are crucial factors in determining workgroups productivity. Results from the laboratory experiment show that reinforcing group identity using a group-solving task contributes to collective coordination efficiency through increasing individuals' initial willingness to provide high efforts for coordinating. Furthermore, individuals whose group identity is uncertain are negatively discriminated against more than individuals with a different group identity, in the long term. Nonetheless, all discrimination patterns vanish when interactions entail high and mutual potential economic incentives. The findings offer several managerial implications for deterring discrimination among individuals to interact and increasing their coordination efficiency when working in teams.

1.4. Intergroup conflicts

One of the main consequences of group identity formation and discriminatory behaviors has been and stills being, the emergence and escalation of intergroup conflicts. In some cases, conflicts lead to violent and bloody wars (Rummel, 1997). Since the end of the Second World War, the number of armed conflicts around the world has gradually increased and reached its maximum number in 2019, most of them occurring within country boundaries (intrastate conflicts).[8] In other cases, conflicts had developed in a more subtle way and without violence (here, violence refers to killing behaviors). For instance, the intergroup conflict regarding the independence of Catalonia from Spain has developed during the last decades without violence and not having to mourn any death.

Several intergroup conflict theories shed light on the reasons individuals from different social categories get involved in conflicts and develop prejudices, stereotypes, and discriminatory behaviors.[9] Intergroup conflicts can emerge as a result of competitive relationships between different social groups over limited resources (Campbell 1965; Sherif, 1966; Esteban and Ray, 2011), by the mere fact of individuals categorizing each other into different social categories (Tajfel and Turner, 1985, 1979; Basu, 2005; Esteban et al., 2012), or by a combination of both structural and psychological factors (Stephan and Stephan, 2000).

These conjectures on the intergroup conflict sources are supported by the classic natural experiment of Sherif et al. (1961) in an Oklahoma summer camp for kids. In this experiment, known as Robbers Cave experiment, kids were randomly assigned to one of two groups when arrived to the summer camp without being aware about the existence of the other group of kids. Then, kids of each group developed a sense of group by interacting and living together for a week, choosing names for their group, and decorating flags and clothes with these names. After that, researchers informed kids about the existence of the other group, which led kids to form negative prejudices towards kids of the other group even before they get in contact and know each other. Lately, experimenters introduced competitive activities between kids of the two groups. The competitive atmosphere did origin conflicts that extended far beyond the

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[8] See https://ucdp.uu.se/downloads/charts/ (active dyads and conflicts by year) and https://ucdp.uu.se/downloads/charts/ (armed conflicts by conflict type and year).
[9] See Böhm et al. (2018) for a review of these theories and empirical measures used to assess conflict-related individual attitudes.

competitive activities, resulting in behaviors intended to harm kids of the other group during the regular camp life. Finally, researchers tried to mitigate the conflict by putting in contact kids of the two groups under neutral conditions (without either a competitive or cooperative connotation). However, a conflictive relationship between the two groups of kids was already created, and the mere contact under neutral conditions resulted in a failure on mitigating the conflict between the two groups of kids, even exacerbating stereotypes and prejudices between them. It was not until kids of the two groups had to cooperate in order to achieve superordinate common goals that conflict attenuated.

As later stressed by Pettigrew (1998), the Intergroup Contact Theory developed by Allport (1954) can explain why the mere contact between the kids in the Oklahoma summer camp did not mitigate the intergroup conflict they were experiencing. The Intergroup Contact Theory defines four conditions under which the contact between members of different social groups in conflict has to occur in order to reduce prejudices and discrimination. The first condition is equality of group status within the situation. Although group status might sometimes be difficult to define, equally group status refers to recognizing members of the two social groups have the same rights. The second and third conditions are the presence of common goals that require cooperation between members of the two social groups to be achieved. Prejudice reduction through contact requires aligning the goals of the two social groups and a real cooperative effort between members of the two social groups to achieve the goals. Finally, intergroup contact requires the support of authorities, law or third parties that can establish norms of acceptance and exert social sanctions and punishments if abuses occur.

There exists an extensive literature in Social Psychology studying interventions rooted in the Intergroup Contact Theory (Allport, 1954) aimed at reducing discrimination and prejudices between members of different social groups.[10] More recently, economists has started contributing to this literature by exploiting natural occurring policies and interventions to study how contact between individuals from different social groups can influence integration, prejudices, and discrimination among them.

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[10] See Pettigrew and Tropp (2006) for a meta-analysis on more than 500 studies testing the Intergroup Contact Theory. See also Paluck and Green (2009) for a literature review. See also Bertrand and Duflo (2017) for a pervasive review of field experimental methods and evidence on discrimination and stereotypes and interventions aimed at mitigating them.

For instance, Bazzi et al. (2019) exploit a national Transmigration program conducted in Indonesia in the 1980s that relocated two million migrants into new communities to unite more than 700 ethnolinguistic groups. The newly formed villages were ethnically diverse in different degrees. This large-scale experiment at national level offered an opportunity to test how intergroup contact affects integration among individuals and the adoption of a new national identity. Furthermore, the exogenously created variation on ethnic diversity within villages also allowed for studying how different segregation and fractionalization degrees affect public goods and conflicts between different ethnic groups. Taking the use of national Indonesian language at home as the main variable, results show that individuals did get more integrated in villages with many small ethnic groups than in villages with few large groups. Also, contribution to public goods became higher in more ethnically diverse and fractionalized villages, and the likelihood of intergroup conflict was lower.

Another example is Carrell et al. (2015) who exploit the random assignation of first year students to squadrons in the U.S. Air Force Academy. This setting allows not only for studying the mere intergroup contact but the *quantity* and *quality* of such contact too. Since squadrons are composed of several members with different academic aptitudes exposure to other race individuals varies along two dimensions, the number of other squadron members of a different race and whether squadron members of the other race are of higher aptitude or not. Results show that white students exposed during their first year to higher aptitude black peers reported in a survey a higher degree of acceptance towards African American individuals. More interestingly, both the number of black peers and their academic aptitude are positively correlated with the likelihood of white students rooming with new black peers in their second year.

The effects of contact between members of different social groups have also been tested by exploiting roommate random assignations among college students. Boisjoly (2006) found that after living with Afro-American roommates, white students at Harvard reported, in ex-post surveys, more positive attitudes toward affirmative action policies and having more frequent social interactions with individuals from other ethnicities. Similarly, Corno et al. (2019) found that white students in a South African university reduced their negative stereotypes (measured using Implicit Association Test) and increased their interactions with students of other races after living with a roommate of a different race. Interestingly, the authors also found a positive effect on black students' academic performance derived from the intergroup contact as a roommate

14

with white students. Black students in mix race rooms increased their average grades and the number of exams passed, and decreased their dropout rates.

Also in a college environment, (Rao, 2019) exploits a governmental policy change that affected several elite private schools in Delhi. The policy consisted in integrating poor students in rich student classrooms. The author investigate the effects of introducing poor students at the classroom level and at more personal level, controlling by rich students who are assigned to a study group or as a partner with poor students, on academic performance, pro-social behaviors and discrimination. To do so, the author combines observational data, a lab experiment, and a field experiment. Results show no significant impact on academic performance by the fact of merging rich and poor students in a classroom. However, rich students became more pro-social. This result relies on the increase on volunteering of rich students to help their school fund-rise for charitable causes. Moreover, rich students also became more generous when playing a set of dictator games in the lab choosing more often an equal split of a particular amount of money between themselves and another anonymous participant. Finally, discrimination is measure using a field experiment in which student must choose teammates for a relay race being aware of others ability (how fast they run) and socioeconomic status (rich or poor student). The first finding in these regards is that high economic incentives for winning the relay race make rich students to discriminate much less than when economic incentives for winning are lower. Second, the mere exposure to poor students in the past, make rich students to discriminate, in overall, 12% less when choosing their teammates.

Despite the amount of research done to test under which conditions intergroup contact between members of different social groups reduce their discrimination and prejudices, less attention has been paid to investigate whether Intergroup Contact Theory conditions proposed by Allport (1954) could also attenuate prejudices and discrimination without requiring individuals to get in contact. In particular, there is a lack of evidence on whether superordinate common goals could reduce discrimination between members of social groups in conflict even if physical interactions do not occur among them.

Chapter 4 presents an online experiment aimed to test whether superordinate common goals not requiring individuals to get in contact can attenuate discriminatory behaviors between members of social groups in conflict; Catalans pursuing the independence of Catalonia from Spain, and Spaniards against it. The Catalan

independentist movement has been historically rooted in a Catalan national identity sense that finds one of its main distinctive traits in the Catalan language. During the last decade, concretely since 2009, a series of referendums for the independence of Catalonia had been held in different municipalities and regions of Catalonia, putting the intergroup conflict at the front in the political arena. The pick of tensions and confrontation in this conflict occurred on the 1st of October 2017, with the last and largest referendum for the independence of Catalonia celebrated. The experiment exploits a natural occurring context in which the emergence of the covid-19 pandemic and the intergroup conflict between Catalans and Spaniards overlapped in time, forcing members of both social groups in conflict to cooperate in order to achieve the superordinate common goal of reducing the spread of the covid-19 virus. Note the cooperation required among individuals to achieve the superordinate common goal consisted of individuals not getting in contact with each other. The "unlockdown" process implemented at a national level by the Spanish government from beginnings May to the end of June 2020 offered a natural environment in which the collective perception of achieving the common goal of reducing the spread of Covid-19 virus gradually increased as people were gradually "unlocked". Along this "unlockdown" process, participants in the experiment played five times a modified version of a Take-or-Give Dictator Game inspired in List (2007) and Bardsley (2008). In this version of the Dictator Game, both the dictator and the four receivers are endowed with the same amount of money. Natural group identity is introduced in the Dictator Game through displaying to participants when deciding as a dictators which language the receivers had chose to conduct the experiment (in each group there was one receiver who chose to conduct the experiment in Catalan, another in Spanish, another in English, and another whose language chosen remained under uncertainty). The dictator can either transfer any amount of its endowment by giving to any receiver, or by taking any amount of any receiver's endowment. This experiment investigates how redistribution decisions towards members of different language group identities evolved as participants move on through the "unlockdown" process, that is, as the superordinate common goal was gradually achieved and the perception of the common threat decreased. Results show that, overall, all participants became more selfish as the superordinate common goal was gradually achieved and were gradually unlocked. Moreover, discrimination patterns of participants who chose to conduct the experiment in Spanish also increased as they were gradually unlocked, whereas discrimination of participants conducting the

16

experiment in Catalan remained constant during the "unlockdown" process. These results highlight that superordinate common goals not requiring individuals to interact mitigate discrimination and selfishness.

1.5. Structure of the thesis

This thesis revolves around the triggers of discriminatory behaviors and the potential mitigating factors of such behaviors. This thesis is structured in the form of a monograph composed of three complete and interrelated manuscripts.[11] Each manuscript focuses on a particular dimension related to discrimination patterns between individuals. The first manuscript serves as a starting point and focuses in reinforcing and attenuating factors of group identity. It measures group identity and quantify its fluctuations as a consequence of behavior comparisons among members of a particular social group. Group identity and its intensity is a crucial factor in predicting the emergence of intergroup conflicts and the intensity of discriminatory behaviors. A better understanding on group identity fluctuations and the reasons leading individuals to reinforce or attenuate their attachment to a particular group identity might provide useful insights for attenuating discrimination between individuals from different social groups. The second manuscript focuses on studying the role group identity uncertainty plays in discriminatory behaviors when individuals decide with whom to interact. The main goal of this manuscript is to test whether individuals are more willing to interact with other individuals from a different social group or with other individuals whose group identity remains uncertain. This manuscript also studies whether discrimination patterns on individual interaction preferences can be mitigated by economic incentives. The third manuscript focuses on studying how discrimination patterns on economic resource allocation decisions between individuals from different social groups, some of them currently in conflict, evolve as a superordinate common goal is gradually achieved. The main hypothesis of this manuscript is that the need to cooperate to achieve a superordinate common goal can mitigate discrimination among individuals from different social groups even if they do not get in contact.

The three manuscripts complement each other by studying the effects of group identity in individual decision-making in different decision contexts. Furthermore, each manuscript explores different mechanisms through which discriminatory behaviors can

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[11] The references of each manuscript are provided at the end of each chapter.

mitigate. Overall, these manuscripts contribute to a better understanding on the triggers of discrimination patterns between individuals and provide insights on which factors can effectively mitigate such discriminatory behaviors.

1.6. Methodology of the thesis

The overarching research approach of this thesis relies on experimental methods widely used in Experimental and Behavioral Economics. This thesis consists of three experiments through which decisions of experimental participants are collected in a controlled environment and economically incentivized to better understand how group identity influences individual decision-making.

A key decision when designing an experiment aimed at studying how group identity affects individual decision-making is whether to use natural group identities or artificial group identities induced in the laboratory. Natural group identities refer to group identities participants bring with them from their real life regarding social groups outside the laboratory. Experiments using natural group identities have the advantage of being able to address research questions directly related to a particular sample of the population with a particular group identity, which usually confers its results a greater external validity. Furthermore, using natural group identities allow for studying particular relationships between different social groups (some social groups might have friendly or fraternal relationships, other keep neutral relationships, and others might be involved in conflict relationships). Chapter 2 and Chapter 4 of this thesis use Catalan and Spanish language group identities to exploit these advantages and measure fluctuations of these group identities and how discrimination between members of the two social groups evolve as a superordinate common goal is gradually achieved.

Another experimental approach widely used in Social Psychology and Economics to study how group identity affects individual decision-making is known as *minimum sense paradigm* (Tajfel et al., 1971). This procedure consists on inducing a minimum sense of an arbitrary and artificial group identity to experimental participants. This procedure has the advantage that avoids stereotypes, status, and expectations attached to members of a particular social group interfere in the decisions of experimental participants. To consider the induced group identities to be minimal, the procedure through which are induced has to accomplish some criteria; participants have to be assigned to non-overlapping groups, participants of the same group cannot interact nor

communicate among them, the anonymity of participants has to be preserved, participants' individual and group interest cannot be in conflict. The *minimum sense paradigm* is a useful experimental tool that allows for establishing causality between group identity membership and differences in the behaviors of experimental participants. Lane (2016) and Pechar and Kranton (2018) meta-analyzed experiments using the *minimum sense paradigm* and concluded that the mere categorization of participants into different arbitrary group identities is enough to activate a group sense that influence individual decision-making.

Another advantage of using artificial group identities is that it offers the opportunity to manipulate group identity saliency from a "minimum" to a "strong" sense. Within the Experimental and Behavioral Economics literature, communication and interdependence in participants' payoffs have been introduced in tasks developed by experimental participants induced with the same group identity to reinforce and intensify their group identity sense. For instance, Eckel and Grossman (2005) and Charness et al., (2014) use cooperative tasks among participants induced with the same group identity and show that interdependence in payoffs increase the saliency of their group identity. Similarly, Chen and Li (2009) and Chen and Chen (2011) found that introducing communication among participants induced with the same group identity while developing independent tasks also reinforce their group identity sense. Other factors that are effective on enhancing experimental participants' group identity saliency is the public exposure of their decisions (Charness et al., 2007) and payoffs (Ioannou et al., 2015) to the other group identity members. Finally, confronting participants induced with different group identity also reinforce the saliency of their group identity (Eckel and Grossman 2005). A common finding in these experiments is that reinforcing group identity tends to increase the effects of group identity on individual decision-making. Chapter 3 of this thesis separately uses the *minimum sense paradigm* and a group-solving task to reinforce group identity to explore the effects of increasing group identity saliency on individuals' interaction preferences and collective coordination in a context with diversity and uncertainty over group identity.

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24

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2

Measuring Group Identity Fluctuations through Purchasing Choices.

Abstract

This paper proposes empirically measure group identity through willingness to acquire goods with representative attributes of social groups. The advantages of such an incentivized measuring method are that it provides a revealed preference measure that quantifies group identity and enables investigating the extent to which individuals reinforce or devalue their group identities from comparing their own behaviors with those of other social group members. This paper presents a laboratory-in-the-field experiment conducted in three Catalan-Spanish-Speaking regions, in which group identities of participants are measured using the Catalan and Spanish translation of a particular book. Besides, group identity variations resulting from acting similar or different from other social group members in a social and individual context are disentangled and quantified. Results found show both Catalan and Spanish participants reinforce by more than 10% their Spanish group identity when receiving information pointing they have acted like other Spanish participants. Besides, Spanish participants attenuate their Catalan group identity by almost a 6% when receiving information pointing they have acted differently than other Catalan participants.

2.1. Introduction

Group identity, also known as social identity, is defined as the individual's sense of belonging to social groups. Theories and models of group identity assume individuals tend to reinforce their group identity and increase their utility when aligning their behaviors with other social group members. In contrast, it is assumed individuals devalue their group identity and lose utility when behaviors among social group members diverge. However, there is a lack of evidence on how much individuals reinforce and attenuate their group identity due to comparing their own behaviors with those of other social group members, perhaps, because measures able to quantify group identity are not abundant. This paper proposes empirically measuring group identity through willingness to acquire goods with representative attributes of social groups to investigate the extent to which converging and diverging behaviors among social group members reinforce and attenuate group identity.

The Social Identity Theory developed by Tajfel and Turner (1979, 1985), together with its extension the Self-Categorization Theory (Turner et al., 1987), describe the reflexive process through which individuals form their group identities. These theories refer to groups of people that have a particular physical or psychological attribute in common as social groups. Social groups distinguish and classify individuals in regards a wide array of social categories like ethnicity, race, religion, nationality, gender, ideology, occupation, sexual orientation, or language, among many others. According to these theories, individuals' group identity formation mostly relies on social categorization, identification, and social comparison. First individuals categorize other individuals and themselves into social groups of many social categories according to their attributes, belief, and behaviors (e.g., ethnic categorization relies on physical attributes, whereas religious categorization relies on belief and behaviors). Thereafter, individuals perceive themselves as members of several social groups and identify with other social group members. As a result, other individuals in a same social group are categorized as in-group and individuals in different social groups as out-group. Once individuals have formed their group identities and developed a sense of belongingness to social groups, individuals increase their self-esteem through positive distinctiveness. Positive distinctiveness refers to social comparisons that accentuate the perceived similarities with the in-group and the perceived differences with the out-group in those dimensions in which the in-group are judged more positively than the out-group (Hogg

and Abrams, 1988).

In the same spirit, the seminal economic model proposed by Akerlof and Kranton (2000) introduces the notion of group identity into the utility function of individuals. The identity-based utility function of individuals they proposed provides explanations for individual behaviors that violate traditional economic assumptions of rationality and self-interest. The model also elaborates on the reasons and mechanism leading individuals to differently behave depending on the social context and whether interacting with an in-group or an out-group individual. The model states that social groups prescribe how its members should and should not behave in different contexts and with different people. [12] Some classic examples are the ten commandments of Christians and different clothing between men and women. The model argues that social group members that follow prescriptions affirm or reinforce their group identity obtaining a utility "gain." In contrast, social group members deviating from prescribed behaviors devaluate group identity and cause a "loss" in utility to themselves and the other group members.

However, there are some interesting questions to which the model developed by Akerlof and Kranton (2000) does not provide specifications. For instance, are the "gains" in utility derived from following a particular prescription higher than the "losses" derived from not follow it? Are utility "gains" and "losses" context dependent? That is, does deviating from a particular prescription in a social context, like not going to pray at church on Sunday, cause the same "loss" in utility than deviating from it in an individual context like not praying at home before going to sleep? Do the answers to these questions generalize to most social groups? Answering these questions will provide a better understanding of individual preferences and behaviors and contribute to enriching the identity-based analysis aimed at tackling intergroup conflicts, secessionist political movements, discriminatory behaviors, and the formation of stereotypes.

To investigate the effects of following and deviating from social group prescriptions in individuals' group identity, it is necessary to measure and quantify individual group identity. Unlike previous studies, this paper complements individual group identity measures obtained from a survey with an empirical measure based on individuals' willingness to acquire goods with identity attributes representative of social groups. The identity attributes of goods are those features of goods that people associate

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[12] The notion of prescriptions in the Akerlof and Kranton (2000) model is very similar to the concept of social norms, which at least dates back to Sherif (1936).

with a particular social group. Examples of goods with identity attributes include flags and t-shirts of nations, sport teams, and political parties. Identity attributes of goods are also related to the production and supply process of the good. For instance, the place where a movie is filmed, the nationality of its director, and the language used during the projection, might be perceived by consumers as identity attributes. According to Social Psychologists individuals consider their possessions as parts of themselves and a central component to maintain and support their group identities (Belk, 1988; Tuan, 1980; Furby, 1978), which suggest that individuals' willingness to acquire goods with identity attributes of social groups they belong to might reflect their group identities.

Measuring group identity through willingness to acquire goods with identity attributes offers several advantages. First, it is a process through which individuals reveal their preferences. Compared to survey measures in which participants declare which are their preferences without any implication for their payoffs or outcomes, eliciting group identity through incentivized decisions on willingness to acquire goods with identity attributes provides an empirical measure closer to the true group identity of individuals. There exists a vast literature studying the differences on eliciting individual preferences between hypothetical and real payoff schemes in many strategic and non-strategic settings.[13] However, to the best of my knowledge, measuring group identity of individuals through incentivized decisions remains unexplored. Another advantage of measuring group identity through willingness to acquire goods with identity attributes is that it offers a measure beyond categorizing individuals into different social groups and allows for quantifying the intensity of group identity.

This paper presents a laboratory-in-the-field experiment aimed at empirically measuring individual group identity through willingness to acquire goods with identity attributes, and how individual group identity is affected by social group member behaviors. The good used to measure individual group identity is a book. The Catalan and Spanish translation of the book are used to manipulate the identity attribute of the good, which is the language. The experiment was conducted in three Catalan-Spanish-Speaking regions. Importantly, the idiosyncrasy of Catalan language in each of the three regions where the experiment was conducted, Catalunya, Illes Balears, and Comunitat Valenciana, have some similarities regarding its group identity connotation, and differences regarding the role of Catalan language in the education system and the

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[13] See Holt and Laury (2005) for a comparison on individual risk aversion preferences obtained using real versus hypothetical incentives.

frequency it is spoken by the population. First, these three regions belong to the "Catalan Countries", a term that refers to the territories where people speak Catalan or one of its variants like Majorcan, in Illes Balears, or Valencian, in Comunitat Valenciana. Although the Catalan Countries term has never corresponded to any official political or administrative unit, it links the Catalan language with Catalan national feelings in some Catalan speakers.[14] On the other hand, the usage of the Catalan language in each of these regions is very different. While in Catalunya and Illes Balears the Catalan is the vehicular language in the education system and its knowledge is compulsorily required to access the university, in the education system of Comunitat Valenciana the Catalan is optional. There are three key factors to measure participants' group identity through their willingness to acquire the Catalan and Spanish book versions are; participants do not already possess none of the book versions, participants do not have reading comprehension problems for any language, and participants feel identified with both languages. One the one hand, participants not being able to read one of the book versions might reduce the willingness to acquire it. Similarly, participants already possessing one of the book versions might not have any incentive to acquire such book version. To avoid reading comprehension problems and already possessing one of the book versions influence participant willingness to acquire both book versions, the experiment was conducted, from shortly before until shortly after the publication date of the book versions, in high schools where teaching included Catalan and Spanish languages.

To assess the effect on participants' group identities derived from acting similar or different than other social group members in a particular social and individual context, it is first needed participants share group identities to perceive each other as members of the same social groups. In this regard, more than 97% of participants declared to identify, at least to some extent, with both Catalan and Spanish languages. Besides, it is needed they can compare each other behaviors in a particular social and individual context. To make it possible, participants played during the experiment two games that are commonly used to measure cooperation and risk preferences. The main purpose of these games is to create a precedent in each participant about their own behavior in each

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[14] Clots-Figueras and Masella (2013) found empirical evidence that students exposed for a longer time to the Catalan language in the compulsory education system developed stronger Catalan feelings and preference for Catalanist political parties (i.e. political parties founded in Catalonia). Moreover, in Chapter 4 of this thesis, there is robust evidence of discrimination between Spanish people based on Catalan and Spanish language.

of these two contexts that later on in the experiment will allow them to compare their own behavior with those of other social group members. The game used to measure cooperation preferences is played by participants in a social context, whereas the game used to measure risk preferences is played by participants in an individual context. Decisions in the first experimental session were used to create feedback about the average cooperative degree and the favorite risk option of participants who declared to identify more with the Catalan or Spanish language (henceforth referred as to Catalan and Spanish participants, respectively). The information contained in these feedback served as a reference point of the behavior either in the social or individual context of Catalan and Spanish participants; the average cooperative level of Catalan/Spanish participants in the social context, and the favorite risk option of Catalan/Spanish participants in the individual context. Note that participants might perceive a particular feedback differently depending on their own decisions in the two games. Participants who were less cooperative than the average cooperative level of Catalan/Spanish participants might realize Catalan/Spanish participants were more cooperative than themselves, which might be perceived as something "positive." Contrarily, participants who were more cooperative might perceive the feedback as something "negative" about Catalan/Spanish participants. Similarly, participants who received the feedback regarding the favorite risk option of Catalan/Spanish participants and chose the same risk option might realize they acted like most Catalan/Spanish participants and perceive the feedback as "positive" information, whereas those who acted differently by choosing a different risk option as "negative" information.

Results show that participants' group identity intensity revealed through their willingness to acquire Spanish and Catalan book versions is highly significantly correlated with their group identity intensity declared toward both languages in a survey. Furthermore, participants react to both "positive" and "negative" information about other social group member behaviors. The information to which more participants react is the "positive" information referring to Spanish participants. Most participants that receive such information increase their willingness to acquire the Spanish book version by approximately 10%, and do it so in a similar magnitude both when the information refers to the individual and social context. On the other hand, Spanish participants decrease their willingness to acquire the Catalan book version by almost 6% when receive "negative" information referring to Catalan participants. These findings offer a novel empirical measure that allows for quantifying group identity

fluctuations, and provide evidence on reinforcing and attenuating factors of group identity.

This paper contributes in the first place, to the literature studying the triggers of discriminatory behaviors and intergroup tensions and conflicts. Group identity has been considered one of the main triggers of intergroup tensions and conflicts (Tajfel and Turner, 1985, 1979; Basu, 2005; Esteban and Ray, 2008; Esteban et al., 2012). As a consequence, several indexes had been developed to inform and predict the emergence and escalation of intergroup conflicts. Examples include fractionalization (Alesina et at., 2003; Fearon, 2003) and polarization (Esteban and Ray, 1994; Wolfson, 1994; Montalvo and Reynal-Querol, 2002, 2003, 2005) indexes. Moreover, there is evidence that increasing group identity saliency tend to increase differences in individual decision-making toward in-group and out-group individuals (Eckel and Grossman, 2005; Charness et al., 2007; Chen and Li, 2009; Chen and Chen, 2011; Charness et al., 2014). The experiment presented in this paper contributes to this literature by providing an additional empirical measure of individual group identity intensity that could be useful on predicting intergroup conflicts, and shows how other social group member behaviors affects individual group identity intensity, which might contribute to increase and attenuate discriminatory behaviors.

This paper also contributes to a better understanding of reinforcing and attenuating factors of individual group identity. In the pioneer model proposed by Akerlof and Kranton (2000) individuals increase their utility when acting like other social group members and experience a disutility when acting differently. However, the model does not distinguish between behaviors occurring in individual or social contexts. Results found in this paper are in line with the model predictions of Akerlof and Kranton (2000), and provide additional evidence on how other social group member behaviors in a social and individual context affects individual group identity.

The rest of the paper is organized as follows. Section 2.2 presents the experimental design and descriptive statistics of participants. In Section 2.3 results are analyzed, and Section 2.4 concludes discussing the results.

2.2. Experimental design

The experiment is comprised of 4 stages that are common to all participants in the experiment. Stage 1 is designed to elicit cooperative and risk attitudes of participants.

The Stage 1 has several purposes. First, to enable participants compare their behaviors in particular contexts later on during the experiment. Second, to obtain variables of cooperation and risk preferences at the participant level that might potentially affect the results. Stage 2 is mainly designed to identify participants that would have some reading comprehension problems either with Catalan or Spanish language and which participants already possessed either the Catalan or Spanish book versions at the time of conducting the experiment. These are two crucial factors that can influence participant decisions in Stage 3. Stage 3 is design to measure the group identity of participants toward the Catalan and Spanish language through their willingness to acquire both book versions. Stage 3 is also used to investigate how participant group identity fluctuates when participants compare their own behavior in Stage 1 with that of other social group members. Stage 4 is designed to measure participant declared group identity intensity toward the Catalan and Spanish language. The main purpose of Stage 4 is to complement the empirical group identity measure obtained in Stage 3 and check whether these two measures are correlated or not.

In Stage 1, participants made two decisions. At the beginning of Stage 1 participants were told they were going to play two games in which they have the opportunity to accumulate valuable points to win final prizes. First, participants played one round of a Public Good Game (PGG) in groups of four. In the PGG participants were endowed with 6 points and decided how many points to share with the other three anonymous members of the group and how many to keep for themselves. Participants knew that the total points shared by the members of the group will be doubled and distributed equally among all group members. Secondly, participants played a Lottery Choice Game and chose one lottery option among six lottery options with different risk degrees. As in Eckel and Grossman (2002), the purpose of the Lottery Choice Game is to measure participant risk aversion, but in a more intuitive and simple context in which the expected payoff of each lottery option is kept constant, and the only difference is the risk degree of each of them. The first lottery option was a safe option that provided the participant 5 points regardless the result of a coin toss. The second lottery option provided 6 or 4 points depending on the result of a coin toss. The risk degree of each lottery option gradually increases until the sixth lottery option, which provided 10 or 0 points depending on the result of a coin toss.

In Stage 2, while participants filled up a reading habits questionnaire, the experimenter tossed a coin and computed each participant's total points obtained in

Stage 1. At the end of the questionnaire, the final prizes were revealed to participants. Participants were told the final prizes were the recently published Harry Potter book written either in Catalan or Spanish. Participants were also asked if they would have some comprehension difficulty reading some of the book versions and whether they already preordered or had in their possession some version of the book.

In Stage 3 participants have to decide how to split their total points obtained in Stage 1 between the two book versions. The book was "*Harry Potter and the Cursed Child*," written either in Catalan or Spanish.[15] Each point allocated to a particular book version granted participants a 1% of probability to win the book version they allocate the point. Note that the representative identity attribute, the language, is the only difference between the book versions and it was highlighted at the time participants made their decision to allocate their points.

In stage 4 participants filled up a questionnaire of more than 40 questions mixing language identification questions with other questions to avoid participants answering the identification questions just after their points allocation decisions and try to minimize participants would answer to such questions concerned about consistency with their decisions of allocating points. The first set of twenty questions were regarding demographics, religion and smoking habits. In the next questions, participants were asked about their language usage within the family unit and social circles. Then, participants were asked about their identity degree, on a scale from 0 to 5, regarding Catalan and Spanish languages, and also regarding Majorcan language in sessions conducted in the Illes Balears and regarding Valencian language in sessions conducted in the Comunitat Valenciana. Finally, participants were asked about sports preferences and time spent on the internet, watching television, and using the mobile phone.

2.2.1. Treatments

The experiment has a Control in which participants do not receive information about the behavior of other participants and six Treatments in which participants receive information about the behavior of other participants. Experimental treatments vary the

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[15] *Harry Potter* is a series of seven fantasy novels often considered cornerstones of modern young adult literature that have inspired children worldwide to become substantial readers. "*Harry Potter and the Cursed Child*" is a book that contains the script for a stage play telling an additional story adding to the stories of the seven previous novels. "*Harry Potter and the Cursed Child*" became the most preordered book of 2016 in Amazon, which suggested that it might be a potential incentive for participants in the experiment (all of them teenagers). At the end of the year it became the bestselling book of 2016 in the U.S. and U.K.

information participants receive in Stage 3 before they split their points between the two book versions. The feedback participants receive in Treatment sessions provides information about how other Catalan or Spanish participants in a previous experimental session did behave either in the PGG or Lottery Choice Game.

Four feedback were formed to distinguish between the effects that behaviors of other participants in a social or individual context might have in participants' group identities. In the Spanish Social Information (SSI) and Catalan Social Information (CSI) treatments, participants are informed about the average number of points shared in the PGG either by Spanish or Catalan participants, respectively. In the Spanish Individual Information (SII) and Catalan Individual Information (CII) treatments, participants are informed about the lottery option most chosen by Spanish and Catalan participants, respectively, in the Lottery Choice Game. Besides, two additional treatments were designed, the Spanish-Catalan Social Information (SCSI) and the Spanish-Catalan Individual Information (SCII) treatments, in which participants were allowed to choose about which participants, Spanish or Catalan, they wanted to receive the feedback information. Table 1 summarizes the information features of feedback provided to participants in each treatment.

Table 1: Feedback features in experimental treatments

Treatment	Information					
	Chosen by participants	Public Good Game	Lottery Choice Game	Spanish	Catalans	Obs.
Control Treatment	No	No	No	No	No	65
Spanish Social Information	No	Yes	No	Yes	No	71
Catalan Social Information	No	Yes	No	No	Yes	58
Spanish Individual Information	No	No	Yes	Yes	No	67
Catalan Individual Information	No	No	Yes	No	Yes	56
Spanish-Catalan Social Information	Yes	Yes	No	Yes/No	Yes/No	40
Spanish-Catalan Individual Information	Yes	No	Yes	Yes/No	Yes/No	35

2.2.2. Feedback formation

Decisions of participants in the first Control Treatment session were used to create the feedback information which was provided to participants. Figure 1 shows the average points shared in the PGG by Catalan and Spanish participants in the first experimental session. It shows that in the first experimental session both Catalan and

Spanish participants shared, on average, approximately 2 points in the PGG. The two feedback referring either to Catalan or Spanish participants' behavior in the social context of the PGG were:

Before you decide how to assign your points, you should know that in a previous session of this experiment, participants that identified more with CATALAN/SPANISH *language decided to share 2 points (on average) in the first game.*

Figure 1: PGG feedback
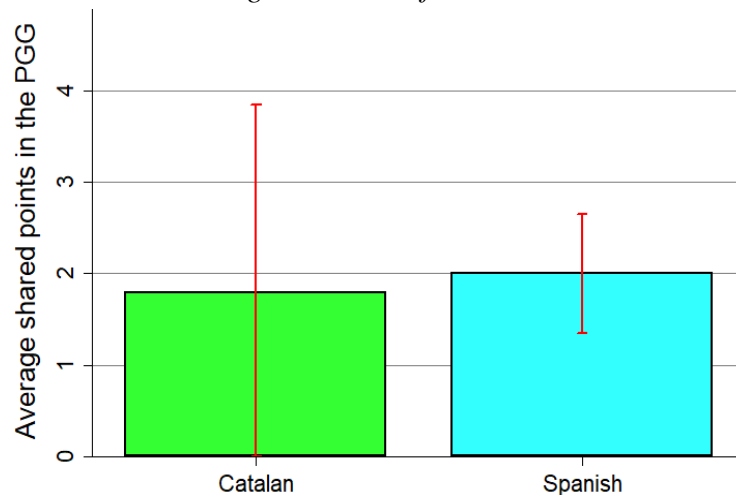
Note: The figure reports the average shared points in the Public Good Game by Catalan and Spanish participants in the first experimental session.

Providing feedback about the PGG to participants brings them a reference point about the cooperative degree of other Catalan or Spanish participants. However, participants might perceive PGG feedback differently depending on their own decisions in the PGG. For instance, participants that shared more than 2 points in the PGG might consider as selfish other participants of a particular group identity when receiving PGG feedback. In contrast, participants that have shared 2 points or less in the PGG might consider other participants of a particular group identity to be generous when receiving a PGG feedback. Recall that sharing points in the PGG benefit the other participants in the group at the expense of incurring a cost for oneself.

To distinguish between these potentially different perceptions over the same feedback information a distinction between "positive" and "negative" feedback information received by participants is done. To illustrate these positive and negative feedback categorizations, consider these two examples:

1. A participant that shared 4 points in PGG will be considered to receive negative information when receiving PGG feedback, as this participant has a higher cooperative degree than the average cooperative degree of Catalan and Spanish participants.

2. A participant that shared 1 point in PGG will be consider to receive positive information when receiving PGG feedback, as this participant has a lower cooperative degree than the average cooperative degree of Catalan and Spanish participants.

To generate the Lottery Choice Game feedback the same procedure as in PGG feedback was followed. Figure 2 shows the percentage of Catalan and Spanish participants that chose each lottery option in the first experimental session.

Figure 2: Lottery Choice Game feedback
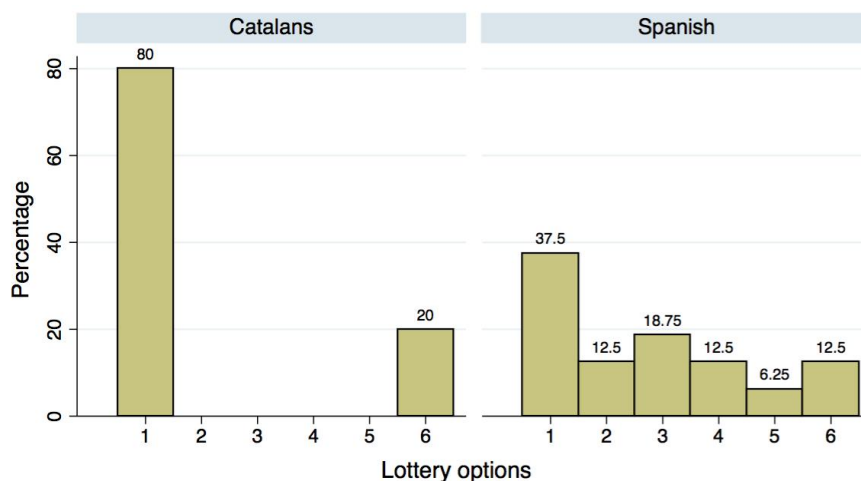
Note: Percentage of Catalan and Spanish participants in the first experimental session choosing each lottery option.

Although Figure 2 shows Catalan and Spanish participants have very different risk preferences, the safe lottery (lottery option 1) was the most chosen lottery option by Catalan and Spanish participants in the first experimental session. The two feedback referring either to Catalan or Spanish participants' behavior in the individual context of the Lottery Choice Game were:

Before you decide how to assign your points, you should know that in a previous session of this experiment, the lottery option 1 (front coin side = 5 points and behind coin side = 5 points) in the second game was the favorite lottery option of participant that identified more with CATALAN/SPANISH language.

Similarly, providing feedback about the Lottery Choice Game to participants brings them a reference point about the most chosen lottery option of Catalan and Spanish participants. Again, the same feedback might be differently perceived by participants depending on their own choice in the Lottery Choice Game. Those participants who had chosen the lottery option 1 might perceive the feedback as they had acted as most participants of a particular group identity, whereas participants choosing another lottery option might perceive the feedback as they had acted differently.

To distinguish between these potentially different perceptions over the same feedback information a distinction between "positive" and "negative" feedback is done. To illustrate these positive and negative feedback categorizations, consider these two examples:

1. A participant that chose the lottery option 4 will be considered to receive negative information when receiving Lottery Choice Game feedback, as this participant did not act like the majority of participants of any group identity.
2. A participant that chose the lottery option 1 will be consider to receive positive information when receiving Lottery Choice Game feedback, as this participant did act like the majority of participants of both Catalan and Spanish participants.

2.2.3. Procedures

The experiment was conducted in Spanish in a total of four bilingual high schools in three Catalan-Spanish-speaking regions, two in Catalunya, one in Illes Balears, and one in Comunitat Valenciana.[16] In all these high schools Spanish and Catalan languages were used as a teaching language. A total of 20 sessions were conducted from 26th of September to 24th of October 2016.[17] The experimenter read aloud the experimental

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[16] See experimental instructions in Appendix A.

[17] The experiment was conducted from shortly before until shortly after the publication of the Spanish and Catalan versions of the book, which were published the 28th of September 2016. Only a 3% of participants declared to be in possession of some version of the book, and a 13% declared they would have some linguistic comprehension problem to read some version of the book.

instruction of each experimental stage at the beginning of each experimental stage. A total of 469 students took part in the experimental sessions, which lasted no more than one hour each. The maximum number of points participants can earn in the PGG is reached and equal to twelve when all group members share all their points. The maximum number of points participants can earn in the Lottery Choice Game is equal to 10. The average probability (total points obtained by participants) of winning a book was 13.9%. A total of 80 books and 469 highlighter pens were provided to participants as a final prize and show-up fee respectively.

2.2.4. Descriptive statistics

The average age of participants was 13.64 years old, of which a 49% were girls and 51% boys. Table 2 reports descriptive statistics on the average of group identity measures, average shared points in the PGG, and the average lottery option chosen of participants. Participants are categorized by the language with which they declared to identify more separately categorizing immigrant participants ("Indifferent" refers to participants that declared to identify the most with Catalan and Spanish languages and in the same degree). Spanish and Catalan group identity intensity were reported by participants in the final questionnaire of Stage 4 in a scale from 0 to 5, and the identity gap variable is the difference, in absolute value, between the Spanish and Catalan group identity intensity. Recall that in the PGG participants decided how many out of their six points to share with the other participants in their group, which is a measure of participants' cooperation degree. On the other hand, in the Lottery Choice Game participants choose a lottery option, from 1 to 6, which were increasing in their risk degree, which provides a proxy variable of participants' risk preferences.

Table 2 shows that a total of 200 Spanish, 46 Catalan, 92 Indifferent, 2 Valencian, 21 Majorcan, and 31 Immigrant participants which represents the 51.02%, 11,73%, 23,47%, 0.51%, 5.36% and 7.91% of the sample, respectively, correctly conducted the experiment. In terms of average shared points Spanish participants are not significantly different than Catalan participants, (p-$value$ = 0.68)[18] nor as compared to Indifferent participants (p-$value$ = 0.71), being the average shared points 2.38, 2.30 and 2.23, respectively. Regarding risk preferences, the favorite lottery option of Catalan, Spanish

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[18] To compare measures across treatments, I use the non-parametric two-sided Mann-Whitney test, using participants as a unit of observation.

and Indifferent participants is the safe lottery option 1 (for the 25.42% of Catalan, 32.86% of Spanish and 29.66% of Indifferent participants). However, Catalans are significantly riskier than the rest of participants at aggregate level (*p-value* = 0.059), whereas Spanish participants (*p-value* = 0.235) and Indifferent participants (*p-value* = 0.864) are not, with average risk levels of 3.34, 2.76, and 2.84, respectively.

Table 2 also shows that the average group identity intensity regarding the main linguistic group identity is 4.91, 4.89 and 4.30 for Spanish, Catalan and Indifferent participants, respectively. These measures are not significantly different between Spanish and Catalan (*p-value* = 0.34), although it is significantly lower for Indifferent participants as compared to Spanish and Catalans participants pooled together (*p-value* = 0.00). These measures reveal that most participants that declared Spanish or Catalan language to be the language they more identify with do it so at the maximum group identity intensity degree of 5. However, these participants might differ on how strongly identify with the language they do not identify the most, that is, how strongly Spanish participants identify with the Catalan language and how strongly Catalan participants identify with the Spanish language.

Table 2: Descriptive Statistics

	Obs.	Spanish group identity intensity	Catalan group identity intensity	Identity gap	Points shared in PGG	Lottery choice
Spanish	200	4.91	2.53	2.37	2.38	2.76
		(0.32)	(1.17)	(1.21)	(1.48)	(1.77)
Catalan	46	3.06	4.89	1.82	2.30	3.34
		(0.85)	(0.37)	(0.87)	(1.63)	(1.94)
Indifferent	92	4.30	4.30	0	2.23	2.84
		(1)	(1)	(0)	(1.63)	(1.85)
Valencian	2	4.50	3	1.5	2	1
		(0.70)	(0)	(0.34)	(1.41)	(0)
Majorcan	21	3.28	2.33	0.94	2.04	2.57
		(0.84)	(1.01)	(0.89)	(1.24)	(1.69)
Immigrant	31	4.70	3.19	1.51	2.03	3
		(0.86)	(1.32)	(0.96)	(1.32)	(2)

Note: The table reports the averages of Spanish and Catalan language group identity measures reported by participants in stage 4 and decisions made by participants in the games of Stage 1. The identity gap variable reports the difference, in absolute value, between Spanish and Catalan language group identity intensity. Participants are categorized in this table by the language they declared to feel more strongly identify with. Indifferent participants declared the same group identity intensity for Catalan and Spanish languages. Participants not born in Spain are categorized as Immigrants. Standard deviations are reported in parenthesis.

Regarding to the secondary linguistic group identity of Catalan and Spanish participants, the average group identity intensity is significantly different (*p-value* = 0.01), being 2.53 for Spanish participants and 3.06 for and Catalan participants (there is not a secondary linguistic group identity for Indifferent participants). As a consequence, the identity gap measure of Spanish participants is significantly higher as compared to that of Catalan participants (*p-value* = 0.002). Hence, Catalan participants declared to feel more identify with the Spanish language than Spanish with the Catalan language.

Figure 3 shows the distribution of participants by identity gap (it takes negative values for Catalan participants). Valencian, Majorcan and Immigrant participants are categorized as Catalan, Spanish or Indifferent, according to their Spanish and Catalan group identity intensity reported in Stage 4. As it can be observed, there are 53 Catalan participants (13.5%), 97 Indifferent participants (24.7%), and 242 Spanish participant (61.8%). The inequality of Catalan and Spanish participants in terms of observations is mainly caused by the sample composition of participants from experimental sessions conducted in the Comunitat Valenciana, where there were 71 Spanish participants, 1 Catalan participant, and 3 Indifferent participants. Note that the composition of Catalan, Spanish, and Indifferent participants of each experimental session is endogenous since it depends on participants' group identity towards the Catalan and Spanish language. Therefore, this is not something under the experimenter's control. Besides, the publication date of the Catalan and Spanish book versions was suddenly anticipated by one month during summer 2016, which forced to conduct the experiment in the high schools that earlier confirm their participation, and limited the capacity to conduct all experimental sessions before the publication date. On top of that, the experimental sessions in Comunitat Valenciana were the last to be conducted, so the imbalance between the number of Catalan and Spanish participants was generated at the end of the experiment, already 3 weeks later from the publication date.

Figure 3: Distribution of participants by Identity gap
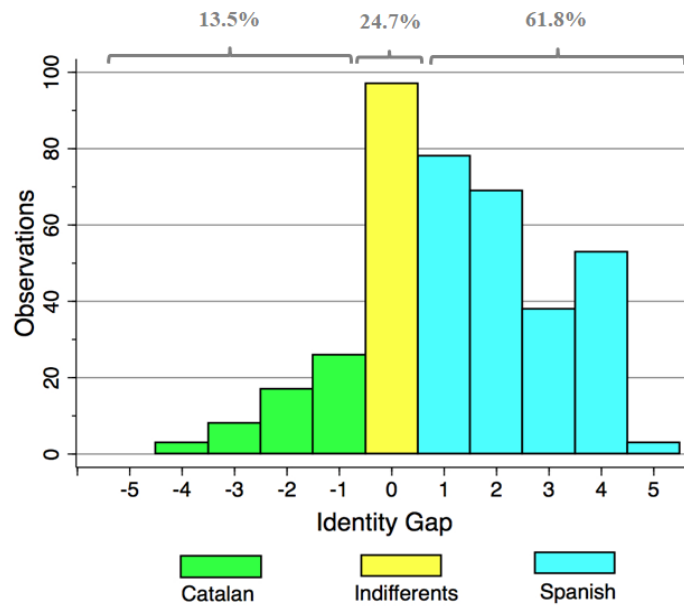
Note: The figure shows the distribution of participants by identity gap levels.

Figure 3 also shows that there are some observations with an identity gap of 5, which implicitly means these participants reported to identify nothing with Catalan language. Despite these three observations and two more observations of Catalan participants, the rest of participants declared to identify with both Catalan and Spanish language at least to some extent.

2.3. Results

This results section first analyzes if individual group identity measures declared by participants in the questionnaire are reflected by their willingness to acquire the two book versions through their allocation of points.

Figure 4 depicts the average proportion of points allocated to the Spanish book version conditional on participants' identity gap (including all participants in the experiment). The position of a bubble indicates a pair of proportion allocation and identity gap. The size of a bubble indicates the number of participants that are in a given pair. The black line plots the average proportion allocation conditional on the identity gap. Conditional means and their respective standard errors are depicted in green for Catalan participants, in blue for Spanish participants, and in yellow for Indifferent participants. Figure 4 shows a clear positive correlation between the proportion of points allocated the Spanish book version and the identity gap, suggesting that as the

identity gap increase (for values distancing from 0) the higher the proportion of points allocated to the book version written in the language participants reported to identify more with. This trend in the empirical decision of allocating points is therefore in accordance with the individual group identity measures provided by participants in the Stage 4 questionnaire. Furthermore, it turns out that conditional means of Spanish participants are closer to the allocation level 1 than conditional means of Catalan participants to the allocation level 0, for all identity gap levels. This fact supports the statement that Catalans participants feel more identified with the Spanish language than Spanish participants with the Catalan language.

Figure 4: Means of points allocated to the Spanish book version conditional on identity gap
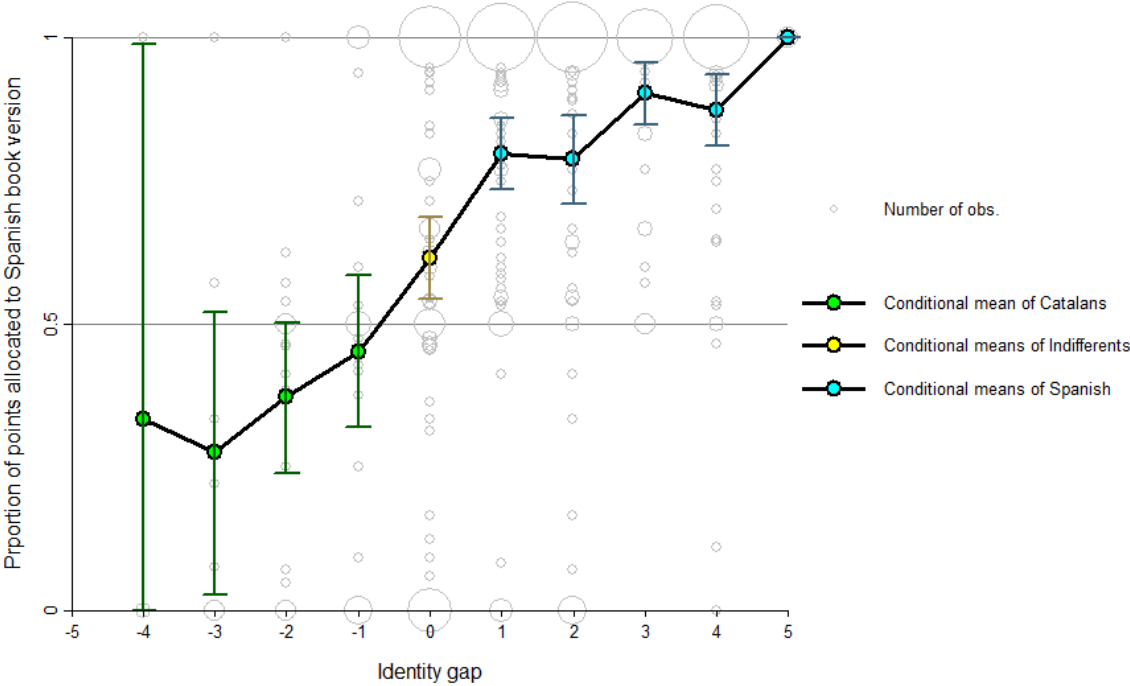
Note: The figure depicts the average proportion of points allocated to the Spanish book version conditional on identity gap levels.

Since each point gives 1% of probability to win the book version the point is allocated to, probabilities to win one, both, or none book versions, depend on the points allocation decision. Consider a participant with 20 points. This participant has a probability of 20% to win one book version if s/he concentrates all points into one book version and a probability of 80% to win none of the book versions. In contrast, if s/he decides to allocate 10 points to each book versions, probabilities will be 9% to win one

book version but not the other for each book version, a 1% to win both book versions and 81% to win none of the book versions. This example illustrates the trade-off participants face between the probabilities to win both book versions and the probability to win none of the book versions. Following with the example, the cost to increase a 1% the probability to win both book versions entails an increment of 1% in the probability to win none of the book versions. There might be two different reasons leading a participant to allocate all the points to one of the two book versions. First, one of the versions might have no utility for the participant. Second, a participant who is risk averse might try to minimize the probability to win nothing.

For this reasons, it is worth to separately analyze the interrelation between points allocated to a particular book version and the identity gap for participants who split points between the two book versions and those who concentrate all the points in one book version. Concretely, to check if the positive correlation between the points proportion allocated to the Spanish book version and identity gap measure remains when participants allocating all the points to a particular book version are excluded, and whether the proportion of participants allocating all their points to a particular book version increases as the identity gap increases.

Figure 5 shows that the positive correlation between the mean of points participants allocate to the Spanish version book and their identity gap remains when participants concentrating all their point in one book version are excluded.

Figure 5: Means of points allocated to the Spanish book version by participants who split points between the two book versions conditional on identity gap
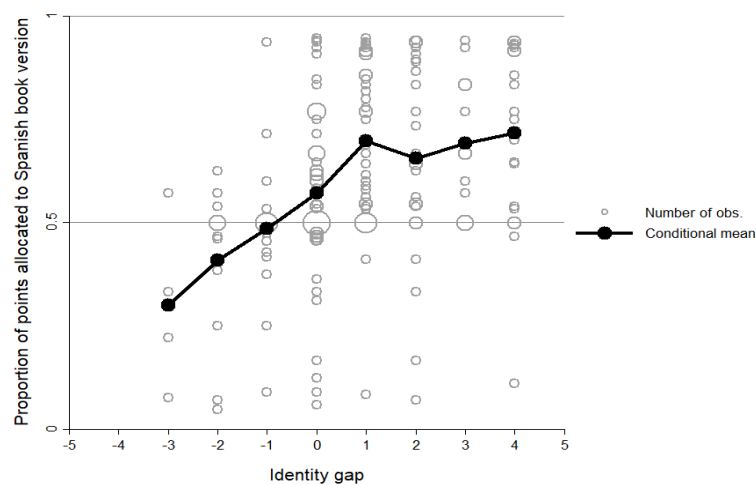
Note: The figure depicts the average proportion of points allocated to the Spanish book version conditional on identity gap levels. Only participants that allocated points to both book versions are included.

Figure 6 shows the proportion of participants within each identity gap level allocating all their points to one book version increase as the identity gap increases (this trend is weak for Catalan participants). In other words, the probability that a participant allocate all the points to one book version is increasing with the distance from the identity gap level 0.

Figure 6: Proportion of participants allocating all the points to one book version conditional on identity gap
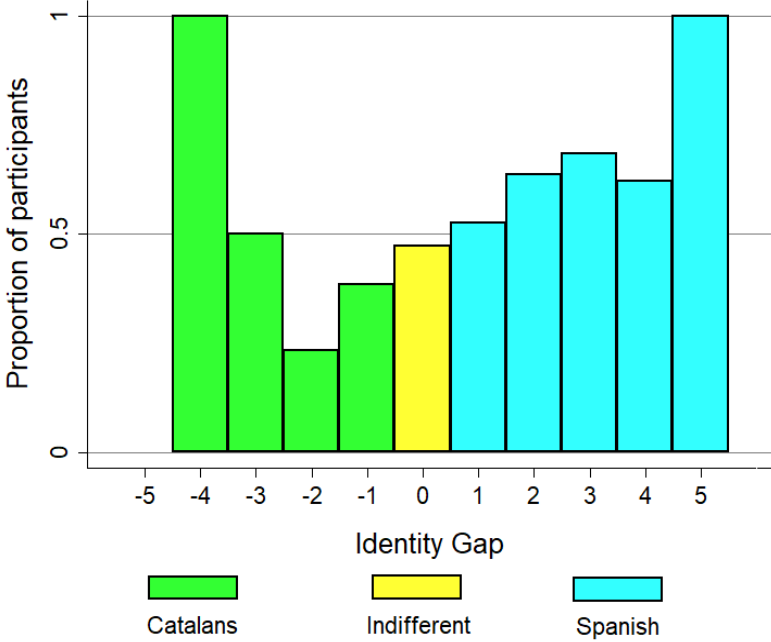
Note: The figure shows the proportion of participants allocating all their points to one book version by identity gap levels.

Therefore, participants' willingness to acquire goods with representative identity attributes of social groups reflects their group identity intensity toward social groups.

Result 1. *Willingness to acquire representative goods of social groups empirically measures group identity.*

To investigate how others' behaviors affect group identity intensity of participants an OLS regression analysis is conducted. Table 3 shows the estimation results clustering robust standard errors at the participant level. In columns 1 and 2 all participants in the experiment are pooled together. In columns 3, 4, and 5, Catalan, Spanish, and Indifferent participants are separately analyzed. In all columns, the

dependent variable is the proportion of points allocated by participants to the Spanish book version. The independent variables, *Spanish*/*Catalan*, take value 1 for participants declaring to identify more with the Spanish/Catalan than the Catalan/Spanish language, and 0 otherwise. *Indifferent* variable takes value 1 for participants declaring te same group identity intensity for Spanish and Catalan languages, and 0 otherwise. *Valencian*, and *Majorcan* variables take value 1 for participants that declared to identify more with Valencian and Majorcan languages, respectively, than with Spanish and Catalan languages, and 0 otherwise. *Identity gap* variable is the difference, in absolute value between the group identity intensity of Spanish and Catalan language. *Immigrant* variable takes value 1 for participants not born in Spain and 0 otherwise. *Total Points* variable is the total points obtained in Stage 1, *Shared Points* variable is the amount of points shared in the PGG, *Lottery Option* is the lottery option chosen in the Lottery Choice Game. *Difficult* variable takes value 1 for participants declaring they would have a comprehension problem to read some of the book versions and 0 otherwise.

Finally, a set of dummy variables referring to the information received by participants in the experimental treatment sessions are included. *Catalan Positive Information* variable takes value 1 for participants receiving positive information about Catalan participants regardless it refers to the PGG or the Lottery Choice Game, and 0 otherwise.[19] *Catalan Positive Social Information* variable takes value 1 for participants receiving positive information about Catalan participants in the PGG, and 0 otherwise. *Catalan Positive Individual Information* variable takes value 1 for participants receiving positive information about Catalan participants in the Lottery Choice Game, and 0 otherwise. Similarly, *Spanish Positive Information* variable takes value 1 for participants receiving positive information about Spanish participants regardless it refers to the PGG or the Lottery Choice Game, and 0 otherwise. *Spanish Positive Social Information* variable takes value 1 for participants receiving positive information about Spanish participants in the PGG, and 0 otherwise. *Spanish Positive Individual Information* variable takes value 1 for participants receiving positive information about Spanish participants in the Lottery Choice Game, and 0 otherwise. Variables referring to negative information follow the same structure as the variables referring to the positive information.

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[19] The categorization rule used to decide when to consider a participant receives positive or negative information is exposed in section *2.2. feedback formation*.

As expected, Table 3 shows the coefficients of interactions between *Spanish* and *Identity gap* variables and between *Catalan* and *Identity gap* variables are statistically significant in columns 1 and 2. Similarly, the coefficients of *Identity gap* variable in columns 3 and 4 are also statistically significant. These coefficients show the proportion of points allocated to the book version written in the language a participant identify more with is higher for participants with higher identity gap values, which provides support for the result 1 previously found. Interestingly, the coefficient of *Spanish Positive Information* variable in column 1 is significant and positive, which means that at aggregate level participants receiving positive information about Spanish participants significantly allocate more points to the Spanish book version. As shown in columns 3 and 4, both Catalans and Spanish participants allocate more points to the Spanish book version when receive positive information about Spanish participants. Even more, this effect holds at aggregate level regardless the information participants receive is about the social environment of the PGG or the individual environment of the Lottery Choice Game, as shown by the positive and significant coefficients of *Spanish Positive Social Information* and *Spanish Positive Individual Information* in column 2. Concretely, participants allocate approximately 10% more points to the Spanish book version when receive positive information about Spanish participants either from the individual or social context. Interestingly, we can also observe some reactions to negative information. The coefficient of *Catalan Negative Information* is statistically significant in column 4, which shows that Spanish participants allocate significantly less points to the Catalan book version, almost 6% less, when they receive negative information about Catalan participants. In the other hand, although only at the 10% of significance, Indifferent participants tend to allocate more points to the Spanish book version when they receive negative information about Spanish participants.

50

Table 3: OLS regression analysis

VARIABLES	(1) Proportion of points allocated to Spanish book (All participants)	(2) Proportion of points allocated to Spanish book (All participants)	(3) Proportion of points allocated to Spanish book (Catalan participants)	(4) Proportion of points allocated to Spanish book (Spanish participants)	(5) Proportion of points allocated to Spanish book (Indifferent participants)
Identity gap	0.017	0.018	**-0.077*****	**0.30*****	---
	(0.156)	(0.167)	**(0.031)**	**(0.011)**	---
Spanish	**0.168*****	**0.165*****	---	---	---
	(0.064)	**(0.060)**	---	---	---
Spanish x Identity gap	**0.028*****	**0.026*****	---	---	---
	(0.008)	**(0.008)**	---	---	---
Catalan	-0.028	-0.047	---	---	---
	(0.107)	(0.106)	---	---	---
Catalan x Identity gap	**-0.092****	**-0.084****	---	---	---
	(0.043)	**(0.043)**	---	---	---
Indifferent	0.012	0.018	---	---	---
	(0.008)	(0.011)	---	---	---
Valencian	-0.003	-0.001	---	**-0.122*****	---
	(0.005)	(0.017)	---	**(0.006)**	---
Majorcan	**-0.223*****	**-0.216*****	0.010	**-0.338*****	**-0.187***
	(0.035)	**(0.033)**	(0.021)	**(0.044)**	**(0.036)**
Immigrant	0.009	0.006	0.006	0.009	0.007
	(0.089)	(0.085)	(0.082)	(0.031)	(0.061)
Total Points	0.003	0.004	0.004	0.006	0.006
	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)
Shared Points	0.011	0.012	0.010	0.012	0.010
	(0.013)	(0.013)	(0.013)	(0.011)	(0.011)
Lottery Option	0.007	0.004	0.007	0.007	0.005
	(0.011)	(0.012)	(0.009)	(0.010)	(0.011)
Difficult	0.013	0.008	0.010	0.013	0.016
	(0.020)	(0.018)	(0.020)	(0.017)	(0.020)
Age	-0.010	-0.010	-0.008	-0.009	-0.014
	(0.021)	(0.020)	(0.023)	(0.022)	(0.028)
Gender	-0.016	-0.019	-0.011	-0.015	-0.021
	(0.020)	(0.024)	(0.017)	(0.023)	(0.015)
Catalan Positive Information	-0.019	---	0.053	-0.061	0.083
	(0.070)	---	(0.175)	(0.116)	(0.196)
Catalan Positive Social Information (PGG)	---	0.022	---	---	---
	---	(0.064)	---	---	---
Catalan Positive Individual Information (Lottery)	---	-0.078	---	---	---
	---	(0.075)	---	---	---
Spanish Positive Information	**0.111*****	---	**0.146*****	**0.122****	0.067
	(0.038)	---	**(0.022)**	**(0.051)**	(0.214)
Spanish Positive Social Information (PGG)	---	**0.116****	---	---	---
	---	**(0.056)**	---	---	---
Spanish Positive Individual Information (Lottery)	---	**0.098*****	---	---	---
	---	**(0.035)**	---	---	---
Catalan Negative Information	0.055	---	0.015	**0.059*****	0.107
	(0.043)	---	(0.011)	**(0.022)**	(0.170)
Catalan Negative Social Information (PGG)	---	0.034	---	---	---
	---	(0.055)	---	---	---
Catalan Negative Individual Information (Lottery)	---	0.074	---	---	---
	---	(0.054)	---	---	---
Spanish Negative Information	0.060	---	-0.064	0.013	**0.261***
	(0.055)	---	(0.053)	(0.049)	**(0.136)**
Spanish Negative Social Information (PGG)	---	0.15	---	---	---
	---	(0.071)	---	---	---
Spanish Negative Individual Information (Lottery)	---	0.032	---	---	---
	---	(0.044)	---	---	---
Constant	**0.617****	**0.621****	**0.764*****	**0.634*****	**0.504****
	(0.286)	**(0.266)**	**(0.277)**	**(0.251)**	**(0.410)**
Observations	392	392	53	242	97

Robust standard errors, clustered at the participant level, are reported in parentheses with *** p<0.01, ** p<0.05, and * p<0.1.

To summarize, social group member behaviors can shape individual group identity. In this experiment, it can be observed at least three different patterns of reinforcement and attenuation of individual group identity derived from social group member behaviors. Note that increasing the points allocated to one book version implicitly means reducing in the same amount the points allocated to the other book version. However, participants receive information only about behaviors of participants from one linguistic group identity. Therefore, any reaction observed after receiving any information is more likely to occur in regards the social group the information is referring to. First, there are participants that increased their group identity intensity towards the social group they feel more identified with since Spanish participants increased the points allocated to the book written in Spanish after receiving positive information about other Spanish participants. Second, there are participants that increased their group identity intensity towards the social group they feel less identified with since Catalan participants also increased the points allocated to the book written in Spanish after receiving positive information about other Spanish participants. And third, there are participants that decreased their group identity intensity towards the social group they feel less identified since Spanish participants reduced the points allocated to the Catalan book version after receiving negative information about other Catalan participants.

Result 2. *Participants receiving information pointing they have acted like other Spanish participants reinforce their Spanish group identity by approximately 10%. This result hold regardless the information refers to a social or individual context. Besides, Spanish participants attenuate their Catalan group identity by almost a 6% when receiving information pointing they have acted differently than other Catalan participants.*

2.4. Discussion

This paper provides experimental evidence that how much individuals identify with social groups can be empirically measured through their willingness to acquire representative goods of such social groups. Moreover, this paper also investigates the effects of social group member behaviors on individual group identities.

Results show that participants' willingness to acquire a Spanish and Catalan version of a book significantly depends on their group identity intensity toward both languages. For participants who are willing to acquire both book versions, their willingness to acquire the book version written in the language they identify more with increases as the difference in the group identity intensity between the two languages increases. Similarly, the likelihood that a participant would be willing to acquire only one of the book versions also increases as the difference in the group identity intensity between the two languages increases. Therefore, willingness to acquire goods with identity attributes can complement other measures like polarization, fragmentation, and radicalization to study the triggers of discriminatory behaviors and the emergence of social tensions and conflicts.

More importantly, this measure enables to quantify the reinforcing and attenuating factors of individual group identities. The second contribution of this experiment relates to the effects that "positive" and "negative" behaviors of other social group members might have on individuals' group identities. Results show that participants react to both "positive" and "negative" information about other social group members. For instance, participants that identify more with one than the other language, intensify their Spanish language group identity after receiving positive information about Spanish participants. On the other hand, "negative" information about Catalan participants attenuates the Catalan language group identity of Spanish participants. As mentioned in the experimental design section, it is not only whether the information about others' behaviors is "positive" or "negative" that might matter but also whether such behaviors occur in a social or individual context. In this regard, participants in the experiment seem to similarly react to "positive" information about Spanish participants when the information refers to an individual or social context.

However, this experiment has some limitations. For instance, the total number of participants and the unbalanced number between Catalan and Spanish participants in the experiment do not allow for separately investigating whether Catalan, Spanish, and Indifferent participants would react differently to information about the individual context compared to information about the social context. For the same reasons, participants who were allowed to choose whether to receive information about Spanish or Catalan participants had been pooled together with participants who were not allowed to choose about which participants they would prefer to receive information.

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Appendix A

General instructions

Welcome and thank you very much for participating in this experiment. You are participating in a study on socio-economic preferences. The instructions will be read aloud by the experimenter to ensure that all participants perform the different stages of the experiment in order and at the same time.

Preliminaries

You should not communicate with the other participants during the experiment. If during the experiment any doubt arises, raise your hand, and the experimenter will come where you are sitting to resolve the doubt in private. All decisions and responses of the experiment you are participating in will be anonymous and confidential. Do not write your name anywhere or comment on your choices with the other participants in the experiment. Remember that communication between participants is not allowed while the experiment is taking place. You will receive a gift for participating that will be given to you at the end of the study. All participants will receive this same gift.

The stages

The experiment consists of 3 stages. You are going to do each stage separately and in order. When you finish a stage, wait in silence until the other participants finish. Then the experimenter will distribute the instructions of the next stage.

Remember

In this experiment, there are no right or wrong answers, or better or worse answers. We simply want to study what you prefer in each of the situations.

Stage 1

In the first stage of the experiment, you will play two games in which you will earn more or fewer points depending on what your choices, the choices of your companions, and chance. These points are very important and serve to increase your chances of winning the final prizes.

Game 1

In this game, we are going to form groups of 4 students from this same class. The composition of the groups will be random and anonymous (no one will know who the members of each group are). To start, you will receive 6 points. You will have to decide how many points to share with the other group members and how many points to keep for yourself. The sum of the points shared by each group member will be multiplied by two, and those points will be distributed equally among all the group members. The final result of each one will be the sum of the points kept plus the points distributed. Let's see a couple of examples.

In a given group, your 3 classmates decide to share 0 points, and you share the 6 points you have. Then, the total of shared points is 6, which multiplied by two, make a total of 12 points to be distributed among the 4 members of the group. Each group member receives 3 points. In total, in this case, your three classmates obtain a total of 9 points (6 + 3), and you obtain 3 points (0 + 3)

Let's see another example, now, your 3 classmates decide to share 6 points, and you share 0 points. Then, the total of points shared is 18 (6x3), which multiplied by two, make a total of 36 points to be distributed among the 4 members of the group. Each receives 9 points. In total, in this case, your three classmates obtain a total of 9 points (0 + 9), and you get 15 points (6 + 9)

Before starting the game, we are going to do a test to see if you understand it. You must circle the correct answer.

If your 3 classmates do not share any points and you share 2 points, how many points do YOU have at the end of the game?

a) 9

b) 5

c) 11

If your 3 classmates share 4 points and you do not share any points, how many points do YOU have at the end of the game?

a) 12

b) 8

c) 6

If you and your 3 classmates share the 6 points, how many points do YOU have at the end of the game?

a) 48

b) 6

c) 12

Now is the time for you to make your own decision. Remember that this decision allows you to earn points, and these are very valuable for the last part of the experiment. This decision is completely anonymous, and you should not discuss it with anyone.

To begin, we give you **6 points** that are now yours. You must decide how many points to share and how many to keep for yourself.

I KEEP: _____

I SHARE: _____

Make sure that the sum between the points you share and the ones you keep is 6.

When you have made your decision, turn the page and wait for everyone to finish deciding.

Game 2

You must decide which of the 6 options you prefer. The options differ in how many points you will be paid if heads or tails occur in a coin toss.

Once everyone has made their decision, one of the participants (chosen at random) will toss a coin, and the result of that toss (heads or tails) will determine the result obtained in this game for all participants (we will not toss a coin to each of the participants).

This decision is completely anonymous, and you should not discuss it with anyone.

	Head	Tail
Option 1	5 points	5 points
Option 2	4 points	6 points
Option 3	3 points	7 points
Option 4	2 points	8 points
Option 5	1 points	9 points
Option 6	0 points	10 points

I COOSE OPTION: _____

Stage 2

Individual questionnaire

1. How much you like reading on a scale of 1 to 10, with 1 being very little and 10 being very much. _____

2. What is your favorite genre of reading? _____

3. About how many books do you read in a year? (do not count those of the school) _____

4. Have you read any Harry Potter books? How many?_____

5. How did you find out about the Harry Potter books?

_____

6. About how long has it been since you read the first Harry Potter book?

_____

7. Which Harry Potter book did you like the most? Why?

_____

_____

8. Who is your favorite character? And the one you like the least?

_____

9. Rate your fondness for Harry Potter on a scale of 1 to 10, with 1 being not at all fond and 10 being very fond. _____

10. Do you know a new Harry Potter book is going to be published?

_____

11. Do you know what day it is published?

_____

12. Do you know the name of the new Harry Potter book?

_____

13. Did you reserve the new Harry Potter book? _____

14. Have you already bought the eighth Harry Potter book? In which language?

_____

15. Are you planning to buy the eighth Harry Potter book?

_____

16. Do you know what the eighth Harry Potter book is about?

60

_____

_____

17. If you were given a Harry Potter book, would you read it?

_____

18. Have you seen any of Harry Potter movies? How many?

_____

19. Where have you seen the movies, at the cinema or at home? _____

20. Is there a book that you like more than Harry Potter? Which?

_____

The final prizes you can win are the Spanish and Catalan versions of the eighth Harry Potter book entitled "Harry Potter and the Crushed child".

Stage 3

Point allocation

We have computed the total points you have earned in previous games of stage 1. The total of points you have obtained you will find it written in red in the box for allocating points.

Important

You must allocate all your points. You can allocate all the points to a single book or split the points between the two books. This decision is completely anonymous and should not be discussed with anyone.

Each point will give you a 1% probability of winning the book to which you allocate the point.

Feedback (treatments)

Before you decide how to assign your points, you should know that in a previous session of this experiment, participants that identified more with CATALAN/SPANISH language decided to share 2 points (on average) in the first game.

Before you decide how to assign your points, you should know that in a previous session of this experiment, the lottery option 1 (front coin side = 5 points and behind coin side = 5 points) in the second game was the favorite lottery option of participant that identified more with CATALAN/SPANISH language.

Dispones de un   total de: [   ]   puntos

Cuantos puntos asignas al libro en Catalán?

Cuantos puntos asignas al libro en Castellano?

Stage 4

Demographic information questionnaire

1. Where were you born?

_____

2. How old are you?

_____

3. Sex?

_____

4. How many siblings do you have?

_____

5. Do you practice any religion?

_____

6. When was the last time you went to church?

_____

7. Quantify on a scale from 0 to 10 the frequency with which you practice your religion, being 1 very occasionally and 10 daily. (0 if you don't practice any religion)

_____

8. Do you live in a town or a city? Which one?

_____

9. Do you use public or private transport to get to the school?

_____

10. Do you have a partner?

_____

11. Have you ever smoked?

_____

12. Have you smoked any cigarettes in the last 30 days?

_____

13. Do you consider yourself a smoker?

_____

14. How many cigarettes can you smoke in a week? And in one day?

_____

15. Do any of your parents smoke?

_____

16. Do you have a smoker friend? Is he your age or is he older than you?

_____

17. Where, when and with whom did you first try tobacco? You like me?

_____

18. Quantify your degree of addiction to tobacco on a scale from 0 to 10, with 1 being very low and 10 being very high. (0 if you have never smoked)

_____

19. Have you ever been caught smoking in high school?

_____

20. What is your father's profession?

_____

21. What is your mother's profession?

_____

22. How many languages do you speak? Which are?

_____

23. In what language do you usually communicate with your mother?

_____

24. And with your father?

_____

25. And with your grandparents?

_____

26. And with your friends?

_____

27. In which language is it more comfortable for you to communicate?

_____

28. On a scale from 1 to 5, quantify your degree of identification with the Valencian language, with 1 being nothing and 5 being a lot.

_____

29. On a scale from 1 to 5, quantify your degree of identification with the Catalan language, with 1 being nothing and 5 being a lot.

_____

30. On a scale from 1 to 5, quantify your degree of identification with the Spanish language, with 1 being nothing and 5 being a lot.

_____

31. On a scale from 0 to 5, quantify your degree of identification with the English language, with 1 being nothing and 5 being a lot.

_____

32. On a scale from 0 to 10 it quantifies the degree of similarity between Catalan and Valencian, with 0 being not at all similar and 10 being very similar.

_____

33. In what language do you prefer to read books?

_____

34. Do you practice sports? Which?

_____

35. What is your favorite sport?

_____

36. What is your favorite team?

_____

37. What is your favorite athlete?

_____

38. Quantify your love for soccer on a scale from 0 to 10, with 1 being very little and 10 being very high. (0 if you don't like soccer)

_____

39. Did you watch the football Eurocup matches this summer? Who would you have liked to win it?

_____

40. Order the following soccer teams in order of preference: Barcelona, Valencia, Madrid, Espanyol, Athletic de Bilbao and Logroñes.

_____

41. Approximately how long do you watch TV per day?

_____

42. What is your favorite show?

_____

43. Do you have paid football at home?

_____

44. Approximately how long do you surf the internet per day?

_____

45. From that time, how much do you do from your mobile phone?

_____

3

The Effects of Group Identity on Interaction Preferences and Coordination Efficiency

Abstract

There is extensive evidence documenting the economic consequences of discrimination patterns between individuals belonging to the same or different group identities. However, many group identities rely on convictions and beliefs that are non-observable, and therefore, might be uncertain. This paper investigates the effects of group identity and its uncertainty on individual interaction preferences and willingness to coordinate. Results from a laboratory experiment using a repeated weakest-link game with endogenous group formation show that unknown-group individuals are discriminated against more than out-group individuals are in the long term. Nevertheless, all discrimination patterns vanish when interactions entail high and mutual economic incentives. The findings offer several managerial implications for deterring discrimination when individuals decide who to interact with and increasing their coordination efficiency when working in teams.

3.1. Introduction

Although similarities and differences between individuals play a major role in determining who interacts with whom in most social and economic contexts, they may not always be observable. Hence, one may deal with uncertainty about the identity of others when deciding with whom to interact. *Homophily* refers to the fact that interactions and bonds among similar people occur more often than among different people. Although *homophily* has been extensively documented (Lazarsfeld and Merton, 1954; Akerlof and Kranton, 2000; McPherson et al., 2001; Currarini et al., 2009; Bisin et al., 2011; Currarini and Mengel, 2016; Goyal et al., 2017), there is a lack of evidence on individual willingness to interact with individuals whose group identity is uncertain (unknown-group). For instance, would employees be more likely to interact, coordinate, and cooperate if they were to know each other's identity, even if they realize they are different by knowing it? The answer to these questions is of special interest to managers of organizations and firms, who deal with group identity diversity among their employees. Deciding the extent to which employees know each other and its contexts may be crucial in determining their willingness to coordinate and cooperate, and consequently, their productivity. Furthermore, it is not yet clear whether homophily is triggered by a preference for interacting "among" in-group individuals or "without" out-group and unknown-group individuals.

As individuals, we define our group identities by categorizing others and ourselves into many social categories such as gender, language, religion, or race (Turner et al., 1987; Tajfel and Turner, 1979; Abrams and Hogg, 2006). Thereafter, we behave differently depending on whether we interact with in-group or out-group individuals. This phenomenon is widely known as intergroup bias (Hewstone et al., 2002), which has been documented in a wide range of individual decision-making. Examples include interaction preferences (Currarini and Mengel, 2016; Goyal et al., 2017), coordination (Charness et al., 2007; Chen and Chen, 2011; Attanasi et al., 2016), cooperation (Eckel and Grossman, 2005), trust (Fershtman and Gneezy, 2001; Heap and Zizzo, 2009), punishment and reward (Chen and Li, 2009), and economic resource allocation (Tajfel, 1970; Ben-Ner et al., 2009; Klor and Shayo, 2010; Kranton et al., 2016; Kranton and Sanders, 2017). Group identity also plays an important role in the formation of work-teams, which are inherent in economic activities requiring different employees to coordinate and cooperate in order to develop a joint project or production process

successfully.[20] Motivating employees who may have different identities to coordinate and cooperate is crucial in many activities, especially those in which the worst performer in the team determines the overall outcome of the work team. For instance, the slowest worker in an assembly line will determine the total number of units produced. A team of auditors who split the workload of auditing a large firm will not be able to sign the audit until each auditor finishes auditing their corresponding section of the balance sheet. In order to increase employee cooperation and coordination when working in teams, many organizations and firms try to instill a common sense of identity among their employees so that they perceive themselves to be members of the same group (Ashforth and Mael, 1989, Akerlof and Kranton, 2005). To do so, organizations and firms attempt to reduce differences and increase similarities among their employees by imposing appearance and behavior codes in the workplace, like wearing uniforms, or by organizing team-building exercises that require employees to work together to achieve a common goal (Ball, 1999).

However, other group identities from those instilled in the workplace may become salient for employees. In particular, employees might care about group identities based on belief and convictions, such as creed, sexuality, or ideology (Golman et al., 2016). The fact that some group identities like place of birth, religion, sexual orientation, or political convictions are non-observable from physical traits is a source of group identity uncertainty that may impede the categorization of an individual into a specific social category.[21] Therefore, workplace contexts are not only homogeneous or diverse with regard to group identity, but may also have uncertainty, which can also affect work teams formation, efficiency, and productivity.

This paper aims to study the effects of group identity uncertainty on individual interaction preferences, and its repercussion on collective coordination efficiency. By doing so in two contexts of different group identity saliency (*weak* and *strong*), this paper provides insights on how often in-group, out-group, and unknown-group individuals choose to interact, and how efficiently they coordinate. Furthermore, this paper also examines how the effects of categorizing individuals into these three group

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[20] 78% of U.S. occupations rank working with others in a group/team as either "extremely important" or "very important" (O*Net, 2020). https://www.onetonline.org/find/descriptor/result/4.C.1.b.1.e?s=1&a=1

[21] Uncertainty over individual group identities based on their beliefs and convictions can be signaled and revealed through possessions like rings, bracelets, necklaces, or representative clothing of a particular social group. However, individuals may not be allowed to dress with such possessions in economic contexts such as the workplace.

identity categories interrelates with group identity salience and potential economic incentives for interacting. Results show that both uncertainty and diversity of group identity are sources of discrimination on interaction decisions. However, out-group participants are discriminated against more than unknown-group participants in the short term. In contrast, in the long term, unknown-group participants are discriminated against more than out-group participants. On the other hand, when interacting with another participant entails high and mutual economic incentives, all discrimination patterns on individual interaction preferences vanish.

In a laboratory experiment, I first replicate the Neighborhood Game of Riedl et al. (2016), in which the interaction and coordination decisions of participants are public information. The Neighborhood Game is a repeated weakest-link game with endogenous group formation in which, in each round, participants simultaneously choose which other participants they would like to interact with and an effort level to coordinate on. Participant payoffs depend on how many other participants they interact with and the differences in effort levels among them. Riedl et al. (2016) found that when the previous decisions of participants are public information, allowing them to choose with whom they want to interact leads to large groups of participants that coordinate fully efficiently. However, as the experiment of Riedl et al. (2016) abstracted from considering "who" the "partners" were, a salient group identity over which there could be diversity or uncertainty among participants was lacking.

To evaluate how the identity of potential partners shapes interaction preferences (discrimination) and coordination efficiency, I design two additional treatments. In these treatments, participants are induced with *weak* or *strong* artificial group identity before playing the Neighborhood Game. In both identity treatments, group identity uncertainty is introduced using a novel *three-group* frame that allows for comparing an individual's interaction decisions toward the in-group, out-group, and unknown-group individuals. Traditionally, experiments using identities induced in the lab to study the intergroup bias on individuals' behaviors use a *two-group* frame. The *two-group* frame consists of inducing different participants with a different group identity to compare decisions toward in-group and out-group individuals.[22] Some of these experiments also study the effects of group identity on coordination among individuals. Charness et al.

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[22] See Eckel and Grossman (2005); Charness et al. (2007); Heap and Zizzo (2009); Chen and Li, (2009); Ben-Ner et al. (2009); Currarini et al. (2009); Chen and Chen (2011); Charness et al. (2014); Chakravarty and Fonseca (2014); Currarini and Mengel (2016); Goyal et al. (2017); Muller (2017); Eriksson et al. (2017); Dickinson et al. (2018) and Jiang and Li (2019).

(2007) and Chen and Chen (2011) showed that sharing a common group identity contributes to coordination through their experiments in which in-group individuals tended to coordinate better than out-group individuals. Furthermore, group identity may also contribute to coordination efficiency through its effects on interaction preferences. For instance, Goyal et al. (2020) found that when individuals of different group identities have different preferences and interaction groups are formed before deciding which action to take, individuals segregate by group identity and coordination accelerates on individuals' preferred action. In this paper, I use a *three-group* frame that introduces unknown-group individuals into the same decision context of in-group and out-group individuals.

The combination of the Neighborhood Game in which interaction and coordination decisions made by participants are public information and the *three-group* frame offers two opportunities in relation to the study of individual interaction preferences. The first one is that it enables studying how potential economic incentives interrelate with the effects of group identity and its uncertainty on interaction preferences. By comparing one's own previous effort level chosen with the previous effort level chosen by others, participants playing the Neighborhood Game can assess the potential economic incentives of each possible forthcoming interaction, and thus, face a trade-off between group identity and potential economic incentives when costless decide with whom to interact. Second, since the Neighborhood Game is a repeated game, it enables studying how interaction preferences toward in-group, out-group, and unknown-group participants evolve over time. These two experimental features enable the evaluation of the extent to which differences in interaction preferences toward in-group, out-group, and unknown-group individuals are triggered either by a positive discrimination pattern toward in-group individuals (in-group favoritism) or a negative discrimination pattern toward out-group and unknown-group individuals (out/unknown-group derogation). Additionally, they enable the evaluation of how these differences depend on economic incentives and how they evolve over time.

Results show that in contexts of *weak* group identity saliency, group identity diversity does not have the same effect on individual interaction preferences as group identity uncertainty does, in the short and in the long term. While initially, interactions among unknown-group individuals occur more often than among out-group individuals, in the long term, unknown-group individuals interact less frequently than out-group individuals do, which suggests that in the long term, even employees aware of being

different would be more likely to work together than employees who do not know each other. Interestingly, when the potential economic incentives for interacting become high and mutual as a result of previously exerting high efforts to coordinate, individuals do not discriminate against each other (neither by known nor by unknown group identities). This result suggests that hard-working employees do not discriminate against each other, and as we will see later, having more of these workers in a workplace has an additional beneficial effect, as they might also push other employees to make greater efforts and thereby contribute to collective coordination efficiency.

This paper first contributes to the literature on Identity Economics, in which models incorporate group identity into individual utility functions (e.g., Akerlof and Kranton, 2000; Chen and Li, 2009) but do not include specifications regarding group identity uncertainty. Nonetheless, there are some experiments that provide evidence on the effects of group identity uncertainty on decision-making. Yamagishi and Mifune (2008), Güth et al. (2009), and Ockenfels and Werner (2014) used one-shot Dictator Games to study the extent to which beliefs contribute to intergroup bias. In doing so, their experiments also reported evidence on how uncertainty about the dictator's group identity affects transfers to in-group and out-group recipients. A general finding of these experiments is that transfers to in-group recipients decrease when dictators are informed that recipients will be unaware of the dictator's group identity. Guala et al. (2013) also found a similar result in a one-shot two-person public good game, in which contributions to the public good between in-group participants decreased when the group identity of one participant was not revealed to the other. My results on initial interaction frequencies among unknown-group participants are in line with these previously found results. However, when studying the evolution of interaction preferences over time, I find that interaction preferences towards out-group and unknown-group participants differ in the short and long term. In particular, unlike in the short term, in the long term unknown-group participants are negatively discriminated against more than out-group participants.

Second, my findings also contribute to a better understanding of the effects that group identity and potential economic incentives have on interaction preferences, and their consequences on coordination efficiency. Endogenous group formation has been proven to boost coordination efficiency among individuals both when individual group identity is considered (Goyal et al., 2020) and not considered (Riedl et al., 2016). This paper adds to this literature by showing that high potential economic incentives for

74

interacting also boosts coordination efficiency and deters discrimination patterns toward individuals whose group identity is either known or unknown.

Finally, I find a remarkably similar intergroup bias on interaction preferences toward in-group and out-group participants in the *weak* and *strong* identity treatments. This result may seem to be in contrast with results found in previous literature showing that intergroup bias between in-group and out-group individuals increases as group identity salience increases (Eckel and Grossman, 2005; Charness et al., 2007; Chen and Chen, 2011; Moscatelli and Rubini, 2013). However, in the *strong* identity treatment, initial interaction frequencies among unknown-group participants are significantly higher than in the *weak* identity treatment, which suggests that increasing group identity saliency may also indirectly increase discrimination against out-group individuals through increasing interactions among unknown-group individuals.

The remainder of the paper is organized as follows. Section 3.2 describes the experimental design. Results are presented in Section 3.3. Finally, Section 3.4 interprets and discusses the findings.

3.2. Experimental design

The experiment had two identity treatments and one control, and it consisted of three stages. In Stage 1, participants were induced with an artificial group identity. Stage 2 was a group-solving task aimed to reinforce group identity. In Stage 3, participants played 20 rounds of the Neighborhood Game. While Stage 1 was common to all participants in the identity treatments, only participants in one identity treatment participated in Stage 2. Participants in the control only participated in Stage 3, which was also conducted by participants in both identity treatments. At the end of each experimental session, participants filled in a questionnaire on demographic traits and answered questions about the experiment.

In the Control Treatment, I replicated a Neighborhood Game conducted in Riedl et al. (2016).[23] In the Weak Identity Treatment, participants were merely induced with an artificial and arbitrary group identity before playing the Neighborhood Game. In the Strong Identity Treatment, participants were also induced with an artificial group

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[23] In contrast to Riedl et al. (2016), I decided to read aloud the experimental instructions and conduct 20 game rounds instead of 30 to reduce the average time participants spend conducting the experiment. An average session of the Neighborhood Game treatment that I was replicating (NT-XL) could have lasted up to 128 minutes.

identity, which was then reinforced through a cooperative group-solving task before playing the Neighborhood Game. Table 1 summarizes the features of each treatment.

Table 1: Sequence of experimental sessions

Treatment	Stage 1	Stage 2	Stage 3
Control Treatment	-	-	Neighborhood Game
Weak Identity Treatment	Group identity inducement	-	Neighborhood Game (*three-group* frame)
Strong Identity Treatment	Group identity inducement	Group identity reinforcement	Neighborhood Game (*three-group* frame)

3.2.1. Stage 1: Group Identity Inducement

In the experimental sessions of identity treatments, participants did randomly choose an envelope when entering the laboratory. Each envelope contained either a blue or a green piece of paper that determined their group identity during the experimental session and which computer terminal they would use. This procedure of randomly inducing an arbitrary and artificial group identity is widely known as the *minimum sense paradigm.*[24] In each experimental session of identity treatments, sixteen participants were induced with a green group identity, while eight participants were induced with a blue group identity.

3.2.2. Stage 2: Group Identity Reinforcement

In the Strong Identity Treatment, the induced group identity was also reinforced before participants played the Neighborhood Game. To reinforce group identity as much as possible, I decided to design a cooperative group-solving task including two factors that had been proven to effectively enhance group identity, communication (Chen and Li, 2009; Chen and Chen, 2011), and interdependence in payoffs (Moscatelli and Rubini, 2013; Charness et al., 2014).

The group-solving task was carried out in groups of eight participants who had been induced with the same group identity. The group-solving task consisted of solving a "math puzzle" equation (sum) composed of eight different geometric figures. Each

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[24] The experiments conducted in Tajfel et al. (1971) are considered the first to use the *minimum sense paradigm.* Lane (2016) and Pechar and Kranton (2018) meta-analyzed experiments using the *minimum sense paradigm* and concluded that the mere categorization of participants into different arbitrary groups is enough to activate a group sense and make discrimination patterns emerge.

76

geometric figure of the math equation had its own value, and each group participant knew the value of one figure. To solve the equation, participants needed to communicate through an online chat and share their own private information about the value of each geometric figure. If all the group participants correctly solved the equation, all of them obtained 450 experimental points, and if they did not, nobody earned anything.[25] Participants did not know whether they had correctly solved the equation until the end of the experimental session.

3.2.3. Stage 3: The Neighborhood Game

The Neighborhood Game is a variation of a tacit coordination game, also known as the Weakest-Link Game or Minimum-Effort Game, introduced by Van Huyk et al. (1990). In the Neighborhood Game, a set of individuals simultaneously choose which other individuals they want to interact with and an effort level to coordinate on. Individual payoffs in the Neighborhood Game depend on the number of other individuals with whom they are interacting and the difference between one's effort and the minimum effort level chosen by any of the individuals with whom one is interacting (including oneself).

In all my experimental sessions, 24 participants $i = \{1, 2, 3, \dots, 24\}$ played the Neighborhood Game for 20 rounds $r = \{1, 2, 3, \dots, 20\}$. In each round, each participant choose an effort level $e_i \in \{1, 2, \dots, 7\}$, and whether to make, or not, an interaction proposal $I_{ij} = \{0, 1\}$ to each of the other 23 participants j in the experimental session. The strategy set of a participant i is defined as $s_i = (e_i, I_{ij})$. For any pair of participants, an interaction proposal to each other, $i \in I_j$ and $j \in I_i$, is required to interact and become "neighbors" in a particular round. The participant groups effectively interacting in a particular round are referred to as interaction groups $K_i = \{K_1, K_2, K_3, \dots, K_{24}\}$. The number of other participants with whom a particular participant interacts in each round is denoted as G_i. Note that the fact that two participants interact between them does not imply they interact with the same other participants, since each participant makes their own interaction proposals and forms their own interaction group for each round.

In each round r, a participant's payoff π_i depends on the effort level chosen e_i, its marginal cost, which is set at $b = 20$, the minimum effort level chosen by any other

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"neighbor" min$\{e_{Ki}\}$ and its marginal return set at $a = 60$, and a component $c > 0$ that guarantees all possible payoffs are positive. These parameters yield to the payoff matrix (expressed in experimental points) of Table 2, which was originally proposed by Van Huyk et al. (1990). Additionally, in the Neighborhood Game, participant payoffs in each round also positively depend on the relative interaction group size $\frac{Gi}{23}$.

$$\pi_{i,r}(s) = \frac{Gi}{23}\left[a\left(\min\{e_{Ki}\}\right) - be_i + c\right].$$

Participant payoffs in each round are the result of multiplying the Table 2 payoff in the cell of the intersection between the participant's effort level and the minimum effort level chosen in the interaction group by the result of dividing the number of "neighbors" by 23.

Table 2: Participant payoff matrix

		Smallest effort level chosen in your interaction group						
		7	6	5	4	3	2	1
	7	130	110	90	70	50	30	10
	6	-	120	100	80	60	40	20
Your	5	-	-	110	90	70	50	30
chosen	4	-	-	-	100	80	60	40
effort	3	-	-	-	-	90	70	50
level	2	-	-	-	-	-	80	60
	1	-	-	-	-	-	-	70

Note: In this table, payoffs are expressed in experimental points. Rows refer to a participant's effort level, and columns refer to the minimum effort level chosen by any "neighbor" within that participant's interaction group (including one's own effort level).

Thus, participant payoffs are an increasing function of the interaction group size and a decreasing function of the difference between one's effort level and the minimum effort level in one's interaction group. Consequently, in each round, an isolated participant that does not interact with any other participant will earn 0 experimental points regardless of the effort level s/he chooses, whereas a participant that chooses the effort level of 1 and interacts with the other 23 participants in the experimental session will earn 70 points regardless of the effort levels chosen by the other participants.

3.2.4. The Three-group Frame

The *three-group* frame aims to introduce unknown-group individuals into the same decision context as in-group and out-group individuals. The *three-group* frame established three sets of eight participants each. All participants within the same participant set were induced with the same group identity. Participants of two sets were induced with a green group identity, whereas participants of another set were induced with a blue group identity. Table 3 shows which color group identity participants in each set were induced with, and the group identity categorization between participants in each set. The participant sets formation, the color group identity inducement, and the group identity categorization between participants, were kept constant across all experimental sessions in both the Strong and Weak Identity Treatments.

Table 3: Three-group frame structure

Participant Set	Group Identity	Group Identity Categorization between Participants		
		Other participants in Set 1	Other participants in Set 2	Other participants in Set 3
1	Green	in-group/in-group	out-group/out-group	unknown-group/unknown-group
2	Blue	out-group/out-group	in-group/in-group	unknown-group/out-group
3	Green	unknown-group/unknown-group	out-group/unknown-group	in-group/in-group

Note: The table reports how participants in identity treatments categorize each other depending on the participants set they are allocated to.

As shown in Table 3, most participants in the Weak and Strong Identity Treatments symmetrically categorized each other as in-group, out-group, or unknown-group. The only exceptions in which participants differently categorized each other occurred with participants in Sets 2 and 3. While participants in Set 2 categorized participants in Set 3 as an unknown-group, participants in Set 3 categorized participants in Set 2 as an out-group. For this reason, in the experimental instructions, participants were only informed about how they would observe other participants' group identity, but not about how they would be observed by the other participants.

The *three-group* frame was implemented in the Neighborhood Game through participant experimental codes. Each experimental code referred to the same participant during the entire experimental session. Figure 1 shows a screen-shot example of one Neighborhood Game round either in the Weak or Strong Identity Treatment.

Figure 1: Three-group frame implementation
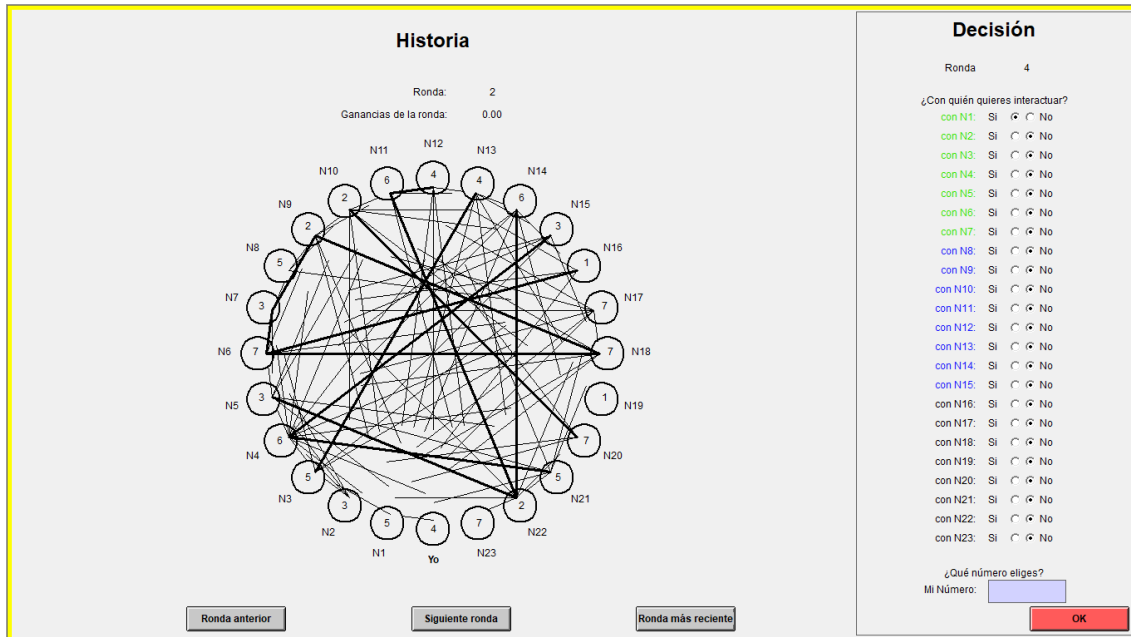
Note: During the Neighborhood Game, participants observe two screen sections. In both screen sections, Decision and History, participants are referred to through experimental codes (Yo, N1, N2,... N23). In the Decision section, participants choose which other participants they want to interact with and their effort level for coordinating. In the History section, circles and their codes on the outside also refer to the other participants in the experimental session. The numbers within the circles are the effort levels chosen by each participant in a previous round (round 2 in this case). Black lines are participant interaction proposals to each other (each participant interaction proposal starts from inside its circle). When two participants mutually consent to interact, a thick line connecting the two circles appear. Participants can observe previous decisions made in any previous round using the three buttons at the bottom of the History screen section.

While playing the Neighborhood Game, participants could observe the other participants' group identity through the color of the experimental codes displayed in the Decision screen section. However, each participant only observed the group identity of participants in their own set and the group identity of participants in another set; the group identity of participants in the remaining set was not observable as their experimental codes were displayed in black. All participants in the identity treatments were aware that participants whose experimental code was displayed in black had also been induced with one of the two color group identities, although they did not know

80

which one, and neither did they know the probability of whether they had been induced with a green or blue group identity.[26]

In each round of the Neighborhood Game, therefore, each participant in the Weak and Strong Identity Treatments made seven interaction decisions regarding in-group participants (participants whose experimental code was displayed in the same color, green or blue, as their own group identity), eight regarding out-group participants (participants whose experimental code was displayed in a different color, green or blue, than their group identity), and eight regarding unknown-group participants (participants whose experimental code was displayed in black).

Participants in the Strong Identity Treatment were informed that their in-group participants were the same participants with whom they had previously conducted the group-solving task.

3.2.5. Hypothesis

The first hypothesis concerns the results in the Control Treatment. In the Neighborhood Game (NT-XL treatment) conducted in Riedl et al. (2016), the authors found that after few game rounds large groups of participants are formed and fully efficiently coordinate. Their results show that participants choosing high effort levels for coordinating exclude participants choosing lower effort levels during the first game rounds. Then, excluded participants gradually increase their effort levels, and finally, once most participants are choosing the highest effort level, all participants interact with each other fully efficiently coordinating. Since the Neighbourhood Game played by participants in the Control Treatment is a replication of the Neighbourhood Game conducted in Riedl et al. (2016), I expect similar results in the Control Treatment.

Hypothesis 1: *After few game rounds, most participants in the Control Treatment interact with each other coordinating their efforts at the highest effort level.*

The second hypothesis concerns the repercussions on interaction frequencies and coordination efficiency from introducing diversity and uncertainty over group identity

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[26] The only difference between the Neighborhood Game played by participants in the Control Treatment and participants in the identity treatments was the color of the experimental codes displayed in the Decision screen section. In the Control Treatment they were all displayed in black and did not have any group identity connotation.

of participants in identity treatments. In the same line as Goyal et al. (2020), I expect participants to segregate by group identity, and therefore total interactions reduce, even though participants keep efficiently coordinating in smaller groups.

Hypothesis 2: *The introduction of diversity and uncertainty over group identity of participants in identity treatments reduce interactions but not coordination efficiency.*

The third hypothesis refers to the triggers of discrimination patterns on individual interaction preferences. By definition, *homophily* is an intergroup bias on individual interaction preferences referring to the fact that individuals interact with other similar individuals more frequently than with different individuals. However, it is not clear yet whether *homophily* is caused due to individuals prefer to interact with other similar individuals (positive discrimination towards the in-group or in-group favoritism) or because they prefer not to interact with different individuals (negative discrimination against the out-group or out-group derrogation). To determine the extent to which the effects of group identity on interaction preferences are caused by a positive or negative pattern of discrimination, I will use the interaction frequency rate of participants in the Control Treatment as a benchmark and compare this rate with the interaction frequency rate of each group identity categorization in each identity treatment. I define a positive discrimination pattern as the cases in which the interaction frequency rate of a particular group identity categorization is significantly higher than that of the Control Treatment. Similarly, I refer to a discrimination pattern as negative when the interaction frequency rate of a particular group identity categorization is significantly lower than that of the Control Treatment. Since there is evidence of individuals simultaneously discriminating positively and negatively in many domains, I expect to find evidence of an intergroup bias on individual interaction preferences partially caused by both positive and negative discrimination patterns.

Hypothesis 3: *Participants in identity treatments positively and negatively discriminate when deciding with whom to interact.*

The fourth hypothesis refers to the effects of group identity uncertainty on discrimination patterns in individual interaction preferences. Intuitively, I expect unknown-group participants not being discriminated against as much as out-group

participants, and do not be treated as favourably as in-group participants. Hence, interaction frequencies among unknown-group participants will always fall in between the interaction frequencies among in-group and out-group participants.

Hypothesis 4: *Unknown-group participants interact less than in-group participants but more than out-group participants.*

The last hypothesis focuses on the interrelation between economic incentives and discrimination patterns. Based on evidence found in other contexts pointing individuals might weigh economic incentives more than group identity when deciding with whom to interact (Charness et al., 2014), I expect participants to attenuate their discrimination patterns as the economic incentives to interact with other participants increase.

Hypothesis 5: *Economic incentives attenuate discrimination patterns.*

3.2.6. Procedures

The experiment was conducted in December 2018 at the experimental laboratory of the Universitat Autònoma de Barcelona. Nine sessions with 24 participants each were conducted, yielding 216 participants in all. Most of our participants (70%) were neither students of economics nor business. Participants were recruited through ORSEE (Greiner, 2004) and were allowed to participate in only one session.[27] Each session lasted no more than one and a half hours. Aside from the experimental instructions, which included the control questionnaire, and the final questionnaire, the experiment was fully computerized using z-Tree (Fischbacher, 2007). Computer terminals were partitioned to impede communication by facial or verbal means. The experimenter read aloud the experimental instructions.[28] After that, experimental supervisors checked the control questionnaire answers of all participants, individually advising subjects with incorrect answers before the experimenter proceeded with the experiment. To keep the real identity of the participants anonymous, we used experimental codes to refer to participants during the experimental sessions. For each participant, each experimental

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[27] Because some registered participants did not show up, we needed to recruit some walk-in participants (less than 5%) for some of the experimental sessions. We found out ex-post that three participants participated in the experiment for the second time in the last experimental session (Control Treatment session). The second observation of these three participants is excluded from the analysis.

[28] See the experimental instructions in Appendix A.

code referred to the same participant during the entire experimental session. The experiment used experimental points as currency, each worth € 0.33 cents (€ 0.0033). At the end of each experimental session, experimental points were converted to cash and participants were paid confidentially. Three independent experimental sessions were conducted for each of the three experimental treatments. Participants were paid, on average, € 7.92 in the Control Treatment, € 7.81 in the Weak Identity Treatment, and € 11.20 in the Strong Identity Treatment.

3.3. Results

The results are organized in two sections. In Section 3.1, the effects of introducing group identity diversity and uncertainty on the overall interaction frequencies among participants and their collective coordination efficiency are analyzed. In Section 3.2, first, the discrimination patterns in individual interaction preferences and their dependence on group identity saliency are analyzed, and then, how discrimination patterns evolve and interrelate with potential economic incentives.

3.3.1. Coordination efficiency

When playing the Neighborhood Game, participants face two coordination failures. First, participants of an interaction group can fail to align their efforts on any of the seven effort levels (individual coordination failure), resulting in disequilibrium wherein participants making greater efforts waste part of these efforts and suffer a cost. Second, participants can align their efforts at the same effort level, but do not do so efficiently, that is, not at the highest effort level (collective coordination failure).[29] Within an interaction group, all participants choosing the same effort level is a pure Nash equilibria because no participant has an economic incentive to individually deviate. Therefore, there are seven pure strategy Nash equilibria that can be Pareto-ranked from the highest effort level equilibrium, known as payoff dominant equilibrium, to the lowest effort level equilibrium, known as risk dominant equilibrium. Once participants of an interaction group overcome individual coordination failure and there are no wasted efforts, coordination efficiency can be measured by the effort level

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[29] Communication (Cooper et al., 1992; Brandts and Cooper, 2007; Blume and Ortmann, 2007), group competition (Bornstein et al., 2002), economic incentives (Brandts and Cooper, 2006) and precedents of successful coordination (Webber, 2006), have been proven to enhance coordination efficiency, which contributes to solving the collective coordination problem.

at which participants are coordinating. When participants coordinate at the payoff dominant equilibrium, fully efficient coordination is reached. However, if they do so at the risk dominant equilibrium, they coordinate at the least efficient coordination level.

Table 4 reports descriptive statistics on the average effort level, the average minimum effort levels of interaction groups, interaction group size, as well as participant earnings, in each treatment (measures from the NT-XL treatment of Riedl et al. (2016) replicated in the Control Treatment are also included). There are no significant differences between the Control and Weak Identity Treatments on any measure. In contrast, the average and minimum efforts, 6.8 and 6.1, respectively, of participants in our Strong Identity Treatment are significantly higher, (p=0.04, n=6)[30] and (p=0.04), than in the Control Treatment, 5.94 and 3.68, respectively. Furthermore, the average interaction group size and participant earnings in the Strong Identity Treatment, 18.65 and 1879.41 (experimental points), respectively, are also higher than in the Control Treatment, 13.3 and 872.94, respectively, although not significantly, (p=0.12) and (p=0.12).

Table 4: Descriptive statistics

	Average effort		Minimum efforts		Interaction group size		Earnings		
	Mean	St.dev.	Mean	St.dev.	Mean	St.dev.	Mean	St.dev.	No. Of Obs.
Control	5.94	0.8	3.68	1.7	13.3	2.84	872.94	574.09	3
Weak	6.07 (0.82)	0.36	3.95 (0.51)	0.75	12.45 (0.82)	1.66	852.52 (0.51)	285.57	3
Strong	6.8 (0.04)	0.13	6.09 (0.04)	0.34	18.65 (0.12)	3.18	1879.41 (0.12)	370.24	3
NT-XL	6.83	0.04	5.41	0.49	20.65	0.41	1915.92	161.3	3

Note: This table reports the mean values of average and minimum efforts, interaction group size, and participant earnings expressed in experimental points for each treatment. The average earnings of the NT-XL treatment are the average participant accumulated earnings up to round 20. The *p*-values for two-sided MW of measures found in the control treatment compared to the measures found in both identity treatments are reported in parentheses.

To evaluate the overall effects of group identity on coordination efficiency, I examine the total wasted efforts and the percentage of interaction groups fully efficiently coordinated in each treatment.

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[30] To compare treatments, I use the non-parametric two-sided Mann-Whitney test, using experimental sessions as a unit of observation.

The total wasted efforts are the sum of the difference between the average effort and the average minimum effort of the interaction groups in each round. Figures 2 depict the evolution of wasted efforts and interaction frequencies for each treatment throughout the rounds (again including measures from the NT-XL treatment of Riedl et al. 2016).

Figures 2: Wasted efforts and interaction frequencies

a) Control Treatment

b) Weak Identity Treatmen

c) Strong Identity Treatment

d) NT-XL Treatment
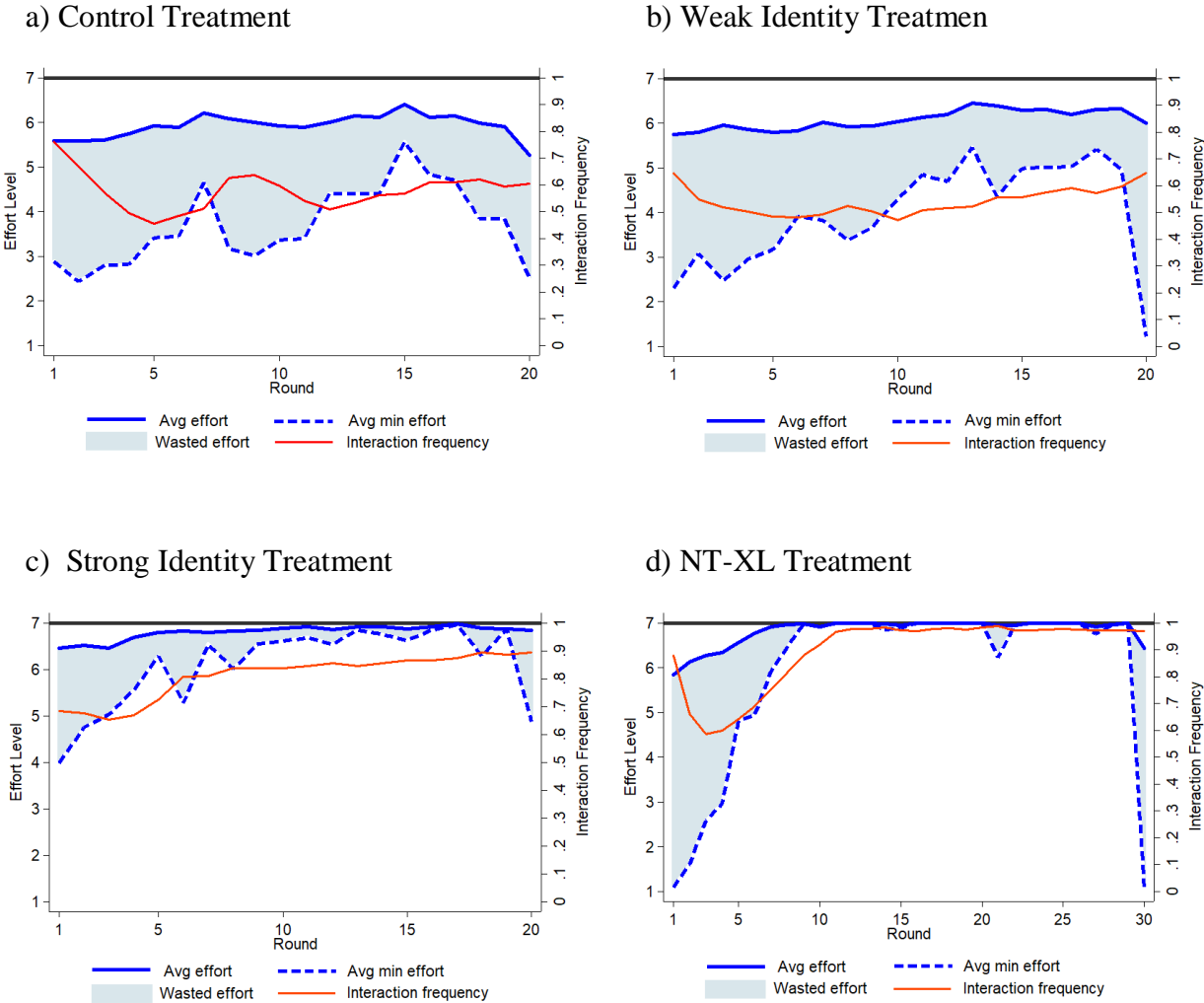
Note: The figures show the evolution of effort measures and interaction frequencies over the rounds. Avg effort is the average of the chosen participant effort level, Avg min effort is the average of the minimum effort of each interaction group, and Wasted effort is the difference between the Avg effort and Avg min effort, and it depicts how efficiently participants coordinate (the lower the Wasted effort, the higher the coordination efficiency). Interaction frequency shows the percentage of interactions that occurs.

The average total amounts of wasted effort per session in the Control and Weak Identity Treatments, 1026.6 and 1017.6, respectively, are not significantly different

(p=0.51), both being approximately three times significantly larger than in the Strong Identity Treatment, 340.6 (p=0.04, p=0.04), and approximately twice as large as in the NT-XL treatment, 519.6 (up to round 20). The total average interaction frequency rate is 81.1% in the Strong Identity Treatment, 57.8% in the Control Treatment, and 54.1% in the Weak Identity Treatment. Differences in the total average interaction frequency rate between the Control Treatment and the Weak and Strong Identity Treatments are not statistically significant (p=0.82, p=0.12, respectively).

Regarding interaction groups that fully efficiently coordinate, Figure 3 shows that the percentages of interaction groups that fully efficiently coordinated in the Control and Weak Identity Treatments, 24.78% and 27.78%, respectively, are not significantly different (p=0.82). In contrast, 66.81% of interaction groups in the Strong Identity Treatment fully efficiently coordinated, a percentage that is significantly higher (p=0.04) than that of the Control Treatment, and approximately 10% lower than the percentage of interaction groups that fully efficiently coordinated in the NT-XL treatment (76.71%).

Figure 3: Fully efficiently coordinated interaction groups
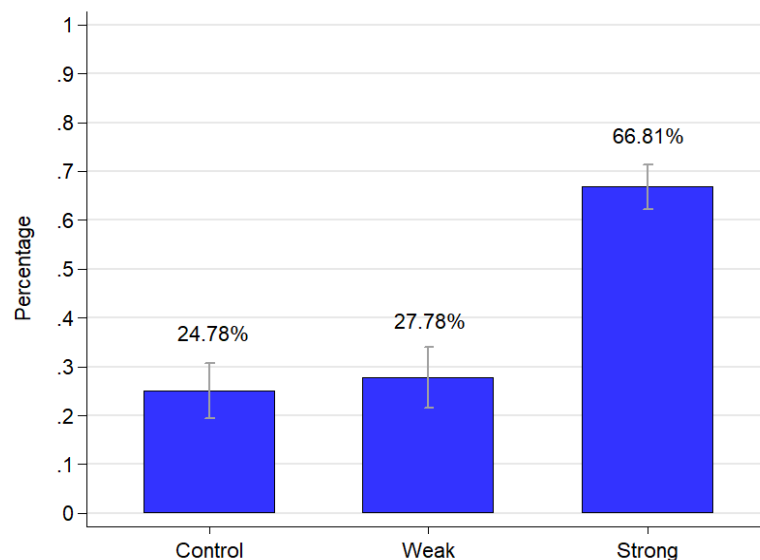
Note: The figure reports the percentage of interaction groups that efficiently coordinated at the highest effort level in each treatment.

Thus, the results show that participants in the Strong Identity Treatment (similarly to participants in the NT-XL Treatment of Riedl et al., (2016)) provide statistically

significant higher efforts, waste fewer efforts, and fully efficiently coordinate much more frequently than those in the Control and Weak Identity Treatments.

Result 1. *Results found in* Riedl et al., (2016) *are not replicated in the Control Treatment, but in the Strong Identity Treatment.*

A plausible explanation for these results might be the initial willingness of participants to provide effort. While the initial interaction frequency rate and average minimum effort of 68.3% and 3.98, respectively, in the Strong Identity Treatment are not significantly different from those of the Control and Weak Identity Treatments, 76.2% (p=0.27) and 2.86 (p=0.27), and 64.8% (p=0.51) and 2.3 (p=0.12), respectively, the initial average effort level is significantly higher in the Strong Identity Treatment, 6.45, as compared to the Control and Weak Identity Treatments, 5.58 and 5.75, respectively (p=0.04 and p=0.04). This difference is mainly caused by the higher proportion of participants in the Strong Identity Treatment initially providing the highest effort level of 7, which is 75%, while only 49.3% and 58.33% of participants in the Control and Weak Identity Treatments initially chose the highest effort level. This result is consistent with results in Charness et al. (2014) in a public good game setting, in which the authors found that after being induced with a group identity and performing a team-building task, the initial willingness of participants to cooperate and contribution rates to the public good significantly increased.

The higher initial proportion of participants choosing the highest effort level in the Strong Identity Treatment increases the potential economic incentive for the other participants to choose the effort level of 7 in subsequent rounds for two reasons. First, because larger interaction groups of participants choosing the effort level of 7 can be formed. Second, because the risk of being excluded by more participants increases for a participant who fails to choose the effort level of 7.

In the Neighborhood Game (NT-XL treatment) conducted in Riedl et al. (2016), the authors found that fully efficient coordination can be reached in large groups of participants through an exclusion mechanism with three stages (reflected in Figure 2 d). In the first stage, participants choosing high effort levels for coordinating exclude participants choosing lower effort levels in early rounds, decreasing the initial interaction frequency rate. Excluded participants then gradually increase their effort levels, which increases the average and minimum effort levels. Finally, excluded

participants are gradually included again in the interaction groups of high effort providers, thereby increasing interaction frequency rates and decreasing wasted efforts while coordinating at the highest effort level. This exclusion mechanism occurs neither in the Control nor Weak Identity treatments, perhaps because, in contrast to most of the participants in the experiment of Riedl et al. (2016), most participants in the Control and Weak Identity Treatments were not students with business or economics academic backgrounds.

However, the same exclusion mechanism occurred in the Strong Identity Treatment, although in a much smaller magnitude. In most cases, participants in the Strong Identity Treatment increased their effort levels in early rounds without the need to be excluded,[31] which increased the average and minimum effort levels without a decrease in initial interaction frequency rates. These trends are reflected in Figure 2 c) and they suggest that, as explained above, participants increase their effort levels in order to form larger interaction groups of participants that exert greater efforts and increase their earnings. After that, similar to the NT-XL of Riedl et al. (2016), most participants in the Strong Identity Treatment interact with each other while coordinating with full efficiency. I conclude, therefore, that reinforcing group identity using a cooperative group-solving task contributes to coordination efficiency by increasing initial willingness to provide greater efforts to coordinate with others, which increases the potential economic incentives for those who do not exert high efforts to exert greater effort subsequently.

Result 2. *Reinforcing group identity using a cooperative group-solving task contributes to coordination efficiency through increasing initial willingness to provide high efforts for coordinating.*

3.3.2. Interaction preferences

To analyze the effects of group identity and its uncertainty on individual interaction preferences, I start by examining initial interaction frequency rates among in-group, out-group, and unknown-group individuals. Then, I look at its evolution over time. By doing so, I first check if intergroup biases on individual interaction preferences

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[31] Detailed comparison between treatments (including the NT-XL treatment of Riedl et al., 2016) on the effect of exclusion on participant effort levels that support my result can be found in Appendix B.

exist, and if so, whether intergroup biases increase as group identity salience increases. I also study whether intergroup biases are consistent over time and how they interrelate with potential economic incentives.

Figure 4 shows the interaction frequency rates in the first round of the Neighborhood Game, in which participants make their interaction proposals without any reference to previous efforts or interaction decisions, hence allowing for the isolation of the effects of group identity saliency on interaction preferences.[32]

Figure 4: Initial interaction frequency rates
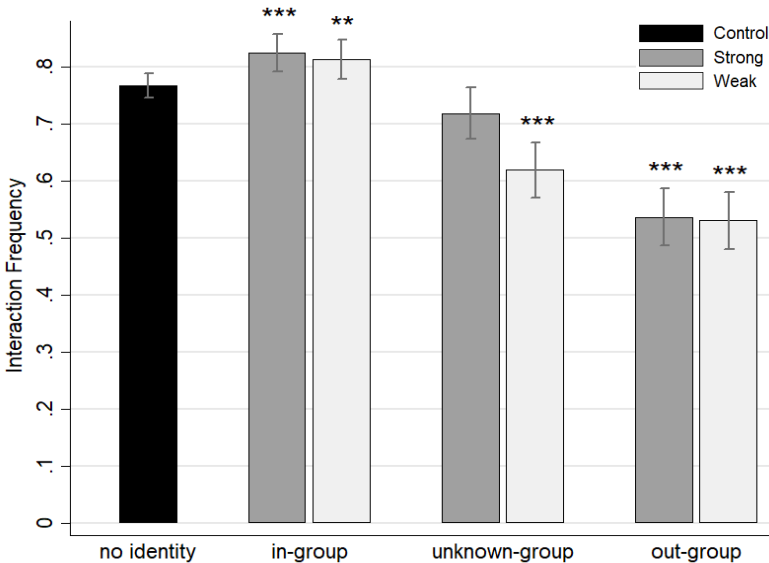
Note: *,**, and *** denote the 1%, 5% and 10% degrees of significance in pairwise two-sided Mann-Whitney tests between the interaction frequency rate in the Control Treatment and each of the other interaction frequency rates in the Weak and Strong Identity Treatments by group identity categorization, in the first round of the Neighborhood Game.

In the Strong and Weak Identity Treatments, interaction frequency rates among unknown-group participants, 71.88% and 61.97%, respectively, are significantly lower ($p=0.03$, $n=120$) [33] and ($p=0.001$) than interaction frequencies among in-group participants, 82.54% and 81.35%, and significantly higher ($p=0.001$ and $p=0.06$) than

[32] Find measures on the degree of group identity saliency reported by participants in the final questionnaire in Appendix C.

[33] To compare the interaction frequency rates across and within treatments, a non-parametric two-sided Mann-Whitney test is used with participants as a unit of observation. As explained in the experimental design section, participants of two sets do not symmetrically categorize each other. Participants in one of these sets are categorized as out-group by participants in the other participant set, while participants in the latter set are categorized as unknown-group by participants in the former set. I excluded interaction decisions between them in all identity analyses. Nevertheless, results do not significantly change if included.

among out-group participants, 53.65% and 53.13%. The interaction frequency rates among unknown-group participants being between the interaction frequency rates among in-group and out-group participants is consistent with the results found by Guala et al. (2013) in public good game settings.

Interaction frequency rates among in-group participants are similar (p=0.49) in the Strong and Weak Identity Treatments, 82.54% and 81.35%, respectively. Similarly, there is a minor difference (p=0.70) in interaction frequency rates among out-group participants in the Strong and Weak Identity Treatments, 53.65% and 53.13%, respectively. Furthermore, differences (almost 30%) in the initial interaction frequency rates among in-group and out-group participants are statistically significant in both the Weak (p=0.001) and Strong (p=0.001) Identity Treatments. In the Control Treatment, 76.71% of the total possible interactions occur. As shown in Figure 4, in both identity treatments, the initial interaction frequency rates among in-group participants are approximately 5% significantly higher than among participants in the Control Treatment. Moreover, the initial interaction frequency rates among out-group participants are approximately 23% significantly lower than among participants in the Control Treatment. Therefore, when comparing the interaction frequency rate in the Control Treatment and the rest of the interaction frequency rates in the identity treatments, the greatest difference in both identity treatments occurs with interaction frequency rates among out-group participants.

Result 3. *The intergroup bias on initial interaction frequencies is mainly triggered by a negative discrimination pattern against out-group individuals, and its magnitude does not vary as group identity saliency increases.*

The intergroup biases found on initial interaction frequencies are mostly due to a negative discrimination pattern against out-group individuals, which is in line with Heap and Zizzo (2009), where, using a trust game setting, they concluded that what reduces trust in groups is a negative discrimination against out-group members. However, the result of a non-increasing intergroup bias on interaction preferences toward in-group and out-group individuals as group identity saliency increases might be in contrast with previous experimental findings showing that willingness to coordinate (i.e., Charness et al., 2007; Chen and Chen, 2011) and to contribute to public goods (i.e., Eckel and Grossman, 2005) increases among in-group members when reinforcing

group identity. Nonetheless, as Figure 4 shows, the initial interaction frequency rate among unknown-group participants in the Strong Identity Treatment is almost 10% significantly higher (p=0.02) than in the Weak Identity Treatment, which suggests that individuals might indirectly discriminate more against out-group individuals when group identity saliency increases, not by interacting more with in-group or less with out-group individuals, but by interacting more with unknown-group individuals.

These results indicate that in the first instance, is it better for individuals to be categorized as unknown-group than to be categorized as out-group in order to interact more often. Specially, in contexts of *strong* group identity saliency, in which unknown-group individuals interact 10% more than in contexts of *weak* or *minimal* group identity saliency.

Next, I study how the initial intergroup biases on interaction preferences evolve over time, and whether they are sensitive to potential economic incentives. Figure 5 presents the evolution of interaction frequency rates (by group identity categories in identity treatments) for each treatment. When looking at interaction frequency rates in the Weak Identity Treatment, it can be observed that the percentage of interactions occurring among unknown-group participants is always the lowest from the third round onward. The interaction frequency rate among in-group participants becomes, and stays, similar to the interaction frequency rate among out-group participants from the eighth round to the end. In contrast, in the Strong Identity Treatment, all the initial differences between in-group, out-group, and unknown-group interaction frequency rates rapidly disappear and these rates become higher than the interaction frequency rates in the Control and Weak Identity Treatments.

Figure 5: Evolution of interaction frequency rates
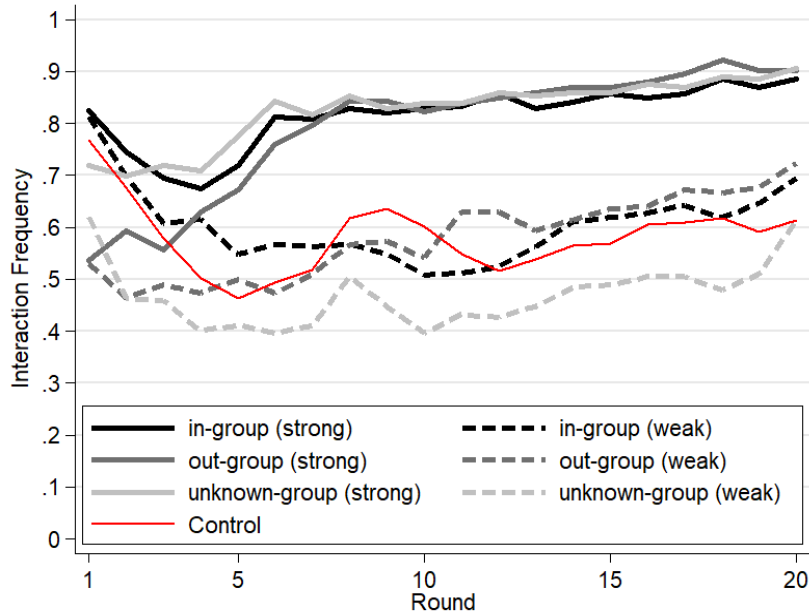
Note: The figure depicts the evolution of interaction frequency rates over the rounds in the Control Treatment (solid red line), and by group identity categorization in the Strong and Weak Identity Treatments (solid grey lines and dashed grey lines, respectively).

To study the interrelation between group identity and potential economic incentives on interaction preferences, I conduct a regression analysis. Table 5 shows the estimation results for OLS regressions and GLS regressions with random effects at participant level, clustering robust standard errors at the participant level.

In both columns, the dependent variable is the interaction frequency in a particular round *r+1* between each pair of participants (interaction frequencies of round one are not included since there is no previous round from which to obtain some of the independent variables). Independent variables are participant efforts in the previous round (*Own effort in r*); the difference (in absolute value) between a participant and other participants' previous effort level (*Effort gap in r*); a dummy that takes the value of 1 for each pair of participants previously choosing the same effort level (*No effort gap in r*); the minimum effort in participant's previous interaction group (*Min effort in r*); and interaction dummy variables denoting the relationship between each pair of participants in terms of group identity (*in-group, out-group and unknown-group*) in each treatment (*Weak* and *Strong*, with *Control* being the omitted group variable) .

Table 5: Regression analysis on interaction frequencies

VARIABLES	(1) Int. Frequency (r+1)	(2) Int. Frequency (r+1)	(3) Int. Frequency (r+1)	(4) Int. Frequency (r+1)
Own effort (r)	0.011**	0.001	0.003	-0.007
	(0.004)	(0.005)	(0.004)	(0.004)
Effort gap (r)	-0.067***	-0.072***	-0.068***	-0.072***
	(0.004)	(0.004)	(0.004)	(0.003)
No effort gap (r)	0.222***	-0.264***	0.200***	-0.303***
	(0.021)	(0.048)	(0.021)	(0.049)
No effort gap (r) x Own effort (r)		0.077***		0.079***
		(0.008)		(0.008)
Min effort (r)	-0.028***	-0.031***	-0.014***	-0.0018***
	(0.004)	(0.004)	(0.003)	(0.003)
Weak x in-group	0.038	0.037	0.035	0.034
	(0.024)	(0.025)	(0.024)	(0.025)
Weak x out-group	-0.069***	-0.073***	-0.053**	-0.057**
	(0.024)	(0.024)	(0.023)	(0.024)
Weak x unknown-group	-0.109***	-0.110***	-0.116***	-0.118***
	(0.020)	(0.021)	(0.022)	(0.022)
Strong x in-group	0.037	0.029	0.053**	0.044*
	(0.028)	(0.028)	(0.026)	(0.026)
Strong x out-group	-0.017	-0.023	0.001	-0.005
	(0.032)	(0.031)	(0.029)	(0.028)
Strong x unknown-group	0.050	0.040	0.066**	0.056**
	(0.033)	(0.033)	(0.028)	(0.028)
Constant	0.545***	0.620***	0.551***	0.631***
	(0.027)	(0.028)	(0.028)	(0.029)
Participant RE	No	No	Yes	Yes
Observations	18,957	18,957	18,957	18,957
Number of participants	213	213	213	213
X^2 tests	*p*-values			
Weak x out-group vs Weak x unknown-group	0.067	0.103	0.013	0.023

Note: The dependent variable in all columns is the frequency rate in a particular round *r + 1* between each pair of participants. *Own effort* is the participant's own effort level in the previous round. *Effort gap* is the effort difference, in absolute value, between a participant and other participants' effort levels in the previous round. *Min effort* is the minimum effort in a participant's interaction group in the previous round. *No effort gap* is a dummy variable that takes the value of 1 in cases where a pair of participants chose the same effort level in the previous round and 0 otherwise. *Weak/Strong* are dummy variables that take the value of 1 when the observation is from a pair of participants in the Weak/Strong Identity Treatment, and 0 otherwise. *In-group/out-group/unknown-group* are dummy variables that take the value of 1 for interaction rates among participants that belong to the same/different/unknown group identity, and 0 otherwise. Interaction frequencies of round one are not included since there is no previous round. Robust standard errors, clustered at the participant level, are reported in parentheses with *** p<0.01, ** p<0.05, and * p<0.1.

As shown in Table 5, unknown-group participants are negatively discriminated against in the Weak Identity Treatment, as shown by the fact that *Weak x unknown-group* coefficients are negative and significant in all columns. Out-group participants are also negatively discriminated against in the Weak Identity Treatment, since *Weak x out-group* coefficients are also negative and significant. The *X² tests* reveal unknown-group participants are negatively discriminated against significantly more than out-group participants in the Weak Identity Treatment.

Result 4. *After the first round, unknown-group participants interact significantly less often than out-group participants in contexts of weak group identity saliency.*

This change over time in the discrimination pattern toward out-group and unknown-group individuals suggests that similarities and differences between individuals are differently perceived in the short and long term. It might be that in the first instance, unknown-group individuals are perceived to be less different than out-group individuals, and consequently, they are less negatively discriminated against. However, as time passes, this perception can reverse and unknown-group individuals might be perceived as more different than out-group individuals, and consequently, they are negatively discriminated against more.

Table 5 also shows that effort levels play a crucial role in determining interaction frequencies among participants. Although, the participant's own previous effort does not significantly affect subsequent interaction frequencies (as the coefficient of *Own effort (r)* is not statistically significant in most columns), the difference between a participant and previous efforts by other participants has a significant effect on subsequent interaction frequency. Specifically, the interaction frequency rate in a particular round decreases by around 6-8% for each additional unit of difference between a participant and other participants' previous effort levels, as shown by the negative and significant coefficients of *Effort gap (r)*. In contrast, the coefficient of *No effort gap (r)* is positive and significant in columns 1 and 3, meaning that two participants previously choosing the same effort level increases their overall interaction frequency rate by approximately 20%. Furthermore, the effects of a participant's previous effort on subsequent interaction frequencies become positive and significant in cases when participants previously chose the same effort level. The coefficient of the interaction between the *Own effort (r)* and *No effort gap (r)* variables is positive and

significant in columns 2 and 4, meaning that once two participants had previously chosen the same effort level, their interaction frequency rate increases by almost 8% for each additional unit of effort level previously chosen.

Interestingly, Table 5 only shows a weakly significant positive discrimination pattern toward in-group and unknown-group participants in the Strong Identity Treatment in columns 3 and 4 (including random effects). We have seen in the previous results section that participants in the Strong Identity Treatment exert, on average, greater effort than participants in the Control and Weak Identity Treatments do. Since most participants in the Strong Identity Treatment choose the highest effort level of 7, most of the interaction decisions are between two participants previously choosing the effort level of 7 (after round 5, this is the scenario in more than 90% of the cases).[34] Recall that participant payoffs in each round reduce as the difference (effort gap) between a participant's effort level and the minimum effort level in a participant's interaction group increases, which implies that the potential economic incentives of possible forthcoming interactions, based on previous effort levels, is asymmetric between participants choosing different effort levels. In such cases, for participants choosing a lower effort level in the past, interacting with participants who chose a higher effort level always entails the same potential profit (regardless of which effort level the other participant chooses). Conversely, for participants who chose a higher effort level, such interactions always entail a potential cost, which increases with the difference in effort levels. [35] In contrast, the potential economic incentives of interactions between two participants who chose the same effort level (no effort gap) in the past are symmetric, positive, and increase with the effort level chosen.

Next, I look into interaction frequency rates by different potential economic incentives based on a comparison between participants' previous effort levels, and group identity. Figures 6 show the interaction frequency rates of both identity treatments by previous effort level gaps, as well as by previous effort levels when the previous effort gap is 0 (average interaction frequencies between pairs of participants previously choosing the same effort level other than 7 are pooled together since they

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[34] See the cumulative distribution of effort levels on each treatment in Appendix D.

[35] In interactions among participants choosing different effort levels, the payoff of the participant choosing the greater effort level will always decrease since the reduction in payoff by interacting with the other participant will reduce the payoff by at least 10 experimental points, which is always more than the increase in payoff that a participant can obtain by interacting with an additional participant.

represent a very small percentage of the total cases, 4.7% and 0.3%, in the Weak and Strong Identity Treatments, respectively).

Figures 6: Interaction frequency rates by previous effort gaps

a) Weak Identity Treatment

b) Strong Identity Treatment
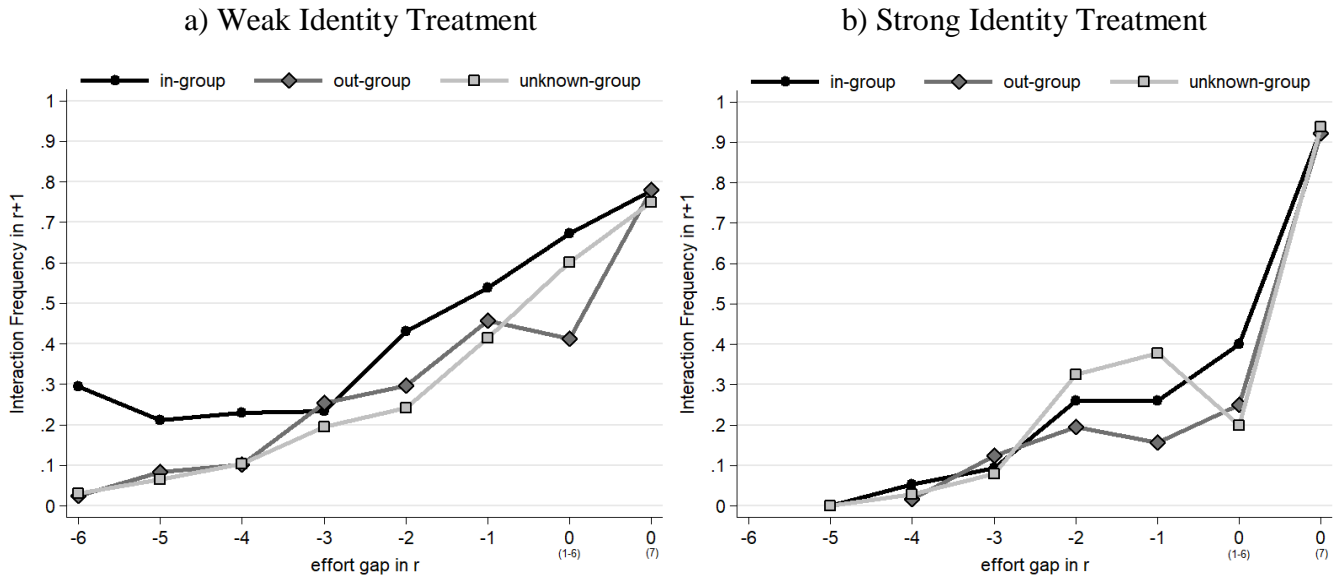
Note: The figures show the interaction frequency rates among participants by group identity categorization conditional on their effort gap in the previous round. Interaction frequency rates among participants previously choosing the effort level of 7 are separately depicted.

Figure 6 b) shows that interaction frequency rates in the Strong Identity Treatment among the in-group, out-group, and unknown-group participants previously choosing the effort level of 7 are 93%, 92.1%, and 93.8%, respectively. Furthermore, a similar result is found in the Weak Identity Treatment (Figure 6 a)), in which interaction frequency rates among the in-group, out-group, and unknown-group participants previously choosing the effort level of 7 are 77.8%, 77.9%, and 74.9%, respectively. Therefore, I conclude:

Result 5. *Discrimination disappears once potential economic incentives for interacting are high enough.*

This result shows that high and mutual potential economic incentives for interacting deter discrimination patterns since participants previously exerting the highest effort level do not discriminate by group identity against other participants that

also previously provided the highest effort level. However, when potential economic incentives for interacting entail a high cost for a participant previously choosing the highest effort level (interactions with participants of a minus six effort gap in the Weak Identity Treatment), participants positively discriminate in favor of in-group participants. In such cases, in-group participants interact 29.3% of the time, whereas out-group and unknown-group participants interact 2.5% and 3.1% of the time, respectively. These differences are mostly triggered by a positive discrimination pattern toward the in-group participants since in the Control Treatment, the interaction rate between pairs of participants previously choosing the effort levels of 1 and 7 is 9.8%.

3.4. Discussion

Gathering in-group, out-group, and unknown-group individuals in repeated coordination games with endogenous interaction group formation enables studying the effects of group identity and its uncertainty on interaction preferences, its interrelation with economic incentives over time, and, consequently, its effect on collective coordination efficiency.

The results show that reinforcing group identity can contribute to collective coordination efficiency through effort levels provided for coordination, which serve as a proxy for potential economic incentives of forthcoming interactions. When reinforcing group identity through a cooperative group-solving task, participants increase their initial willingness to provide high levels of effort on coordination. This increases the potential economic incentives of subsequently interacting with these participants, which motivates other participants to increase their effort levels as well, and this leads to the formation of large groups that are able to coordinate fully efficiently.

Regarding individuals' interaction preferences, the results show that when interactions entail a potential economic incentive that is high and mutual, that is, in interactions among participants who previously exerted the highest effort level, all discrimination patterns vanish. However, aside from this particular case, unknown-group individuals initially interact more often than out-group individuals do, but after the first instance, unknown-group individuals may be negatively discriminated against more. A plausible explanation for this increase in the discrimination pattern against the unknown-group individuals after the first instance might be a change in preferences caused by a change in the individual's cognitive categorization process with regard to

other individuals. It might be that in the first instance, individuals feel more similar to unknown-group than to out-group individuals, and consequently discriminate more against the out-group individuals. However, as time passes, individuals may feel more similar to those individuals whose group identity is known, including out-group individuals, than to those whose group identity is not known, and consequently, may discriminate more against those individuals whose group identity is unknown. An important question remains regarding the effects of group identity uncertainty on interaction preferences. In our experiment, as participants could not decide whether to reveal their group identity, our results apply only to situations in which the uncertainty of an individual's group identity is involuntary. Further research should be conducted to examine more comprehensively the effects of group identity uncertainty on interaction preferences and determine if individuals are differently discriminated when they have the opportunity to reveal their group identity but do not do so compared with when they do not have the opportunity to reveal their group identity.

The results also show that intergroup bias on individual interaction preferences toward in-group and out-group participants does not increase as group identity saliency increases. While this is consistent with the findings of Chen and Li, (2009), might also be in contrast with some previous experimental findings showing that intergroup bias in the behavior of others increases as group identity saliency increases (Eckel and Grossman, 2005; Charness et al., 2007; Chen and Chen, 2011). Some plausible explanations might be that the intergroup bias on interaction preferences between in-group and out-group individuals is either dual or it saturates at a certain degree of group identity saliency. Perhaps once individuals discriminate between in-group and out-group individuals, they do it regardless of group identity saliency, or perhaps individuals increasingly discriminate until a certain level of group identity saliency is reached (which may have been reached in our Weak Identity Treatment)[36] from which the magnitude of discrimination against out-group individuals stops increasing. The results show that unknown-group participants are less negatively discriminated against in the Strong Identity Treatment compared with the Weak Identity Treatment, which suggests that individuals may indirectly discriminate more negatively against out-group individuals when group identity is reinforced by interacting more frequently with

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[36] Lane (2016) surveyed and meta-analyzed discrimination patterns in economics experiments. He found that merely categorizing participants into groups, following the *minimum sense paradigm* criteria to induce artificial group identity, does not produce the minimal level of discrimination, which suggests that the degree of group identity saliency reached using this procedure is higher than minimal.

unknown-group individuals. Further research aiming to disentangle saturation and duality would enable a better understanding of the effects of group identity saliency in individual decision-making.

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Appendix A

A.1. Control Treatment experimental instructions (translated from Spanish to English)

General Instructions

Welcome and thank you for participating in our experiment. This experiment has the objective of studying decision making. In this experiment, your decisions will affect your earnings and the earnings of the other participants in this session. Throughout the entire experiment, which will last approximately 1 hour, your earnings will be counted in points. Points will be converted to Euros (€) at a ratio of:

<div align="center">

3 points = 1 € cent

</div>

At the end of the experiment, in addition to the € 5 for your participation, you will confidentially receive a **payment in cash for your accumulated earnings** throughout the entire experiment **(€)**.

It is important that you understand the rules of the experiment, so please read these instructions carefully. At the end of these instructions you will have to answer several questions to make sure that you have understood the experiment in which you are going to participate. When all participants correctly answer these questions, the experimenter will collect your instructions and the experiment will begin. At the end of the experiment, you will be asked to fill out a questionnaire, while the experimenter calculates the earnings in € of each participant.

During the experiment, communication between participants will only be allowed under the conditions specified in these instructions. Any other type of communication is not allowed and may lead to immediate expulsion from the experiment. The use of mobile phones is not allowed. You will not receive information about the real identity of the other participants either during the experiment or after the experiment. Likewise, the other participants will not receive information about your real identity.

If at any time you have a question, raise your hand and the experimenter will come over to resolve it privately.

Experiment

In this experimental session there are **24 participants**, that is, there are 23 other participants besides you. Each participant is indicated with a letter and a number. You will receive the name "**me**". The other 23 participants will receive the names **N1, N2,…., N23**. The same name will always refer to the same participant throughout the entire experiment.

The experiment consists of **20 rounds** of the same game. In each of these rounds you can accumulate points. Your earnings during the experiment will be the sum of points you accumulate throughout the 20 rounds. At the end of the experiment, we will convert all the points you accumulate into **Euros (€)** at a ratio of 3 points = 1 € cent.

In each round, you and the other participants will have to make two decisions. The first **decision** is "**Who do you want to interact with?**", and the second **decision** is "**Which number do you choose?**". Both of your decisions, and the decisions of the other participants, will affect your earnings and the earnings of the other participants. These decisions that you will have to make are explained in detail below.

1· DECISIONS

Decision: "¿Who do you want to interact with?"

You must decide who you want to interact with in each of the rounds. You can **propose** an interaction to any other participant and you can propose as many interactions as you want (not proposing any interaction is also a valid option). Your interaction proposals, together with the interaction proposals of the other participants, will determine with whom you will interact in each of the rounds as follows:

- **You will interact** with another participant to whom you propose to interact **if and only if** that participant also proposes to interact with you. This means that **mutual consent is required** for the interaction between two participants to be effective.
- If a **mutual consent** for interacting between two participants **is not reached**, those participants **will not interact** in that round.

From now on, we will call the **participants you interact with: your neighbors**. Therefore, your neighbors will be those participants to whom, in a given round, you have made an interaction proposal, and at the same time, they have made an interaction proposal to you.

Decision: "¿Which number do you choose?"

In each round, each participant will choose a number from **1 to 7**. This is: 1, 2, 3, 4, 5, 6, or 7. **Your earnings** in each round will depend on:

1. The **number you choose**.
2. The **lowest number** chosen by **your neighbors and yourself**.
3. **The number of neighbors you have**.

You must choose **only one number** in each round. However, you can change your choices of who you want to interact with as well as the number chosen in each of the rounds.

This will be your payoff table expressed in **points**:

		Smallest number chosen by your neighbors and you						
		7	6	5	4	3	2	1
	7	130	110	90	70	50	30	10
	6	-	120	100	80	60	40	20
Your	5	-	-	110	90	70	50	30
chosen	4	-	-	-	100	80	60	40
number	3	-	-	-	-	90	70	50
	2	-	-	-	-	-	80	60
	1	-	-	-	-	-	-	70

Since your own decision of the number to choose can be a number from 1 to 7, the lowest number can be any number from 1 to 7. Your earnings in each round will be determined by the **cell** at the intersection of the row: "**Your chosen number**", and the column: "**Smallest number chosen by your neighbors and you.**" Note that if your choice of "Your number" is 4, then the "smallest number by your neighbors and you" never could be a 5, or a 6, or a 7.

The points you will earn in each round will be those indicated in the payoff table, multiplied by: **number of neighbors / 23**. This aspect of the earnings is detailed in the examples that you will see below

For each participant in the experimental session that you do not interact with (participants who are not your neighbors) you will not get any profit. For example, if you don't have any neighbor in a round, your total earnings in that round will be 0 points.

2· EXAMPLES:

Suppose you have 12 neighbors in a round. You choose the number 3 and the lowest number chosen among your neighbors and you is 1. In this case, your earnings in this round will be: 12/23 * 50 = 26'08 points.

Suppose you have 23 neighbors in a round. You choose the number 5 and the lowest number chosen among your neighbors and you is 3. In this case, your earnings in this round will be: 23/23 * 70 = 70 points.

Suppose that in a round you have 9 neighbors. You choose the number 6 and the lowest number chosen among your neighbors and you is 4. In this case, your earnings in this round will be: 9/23 * 80 = 31'3 points.
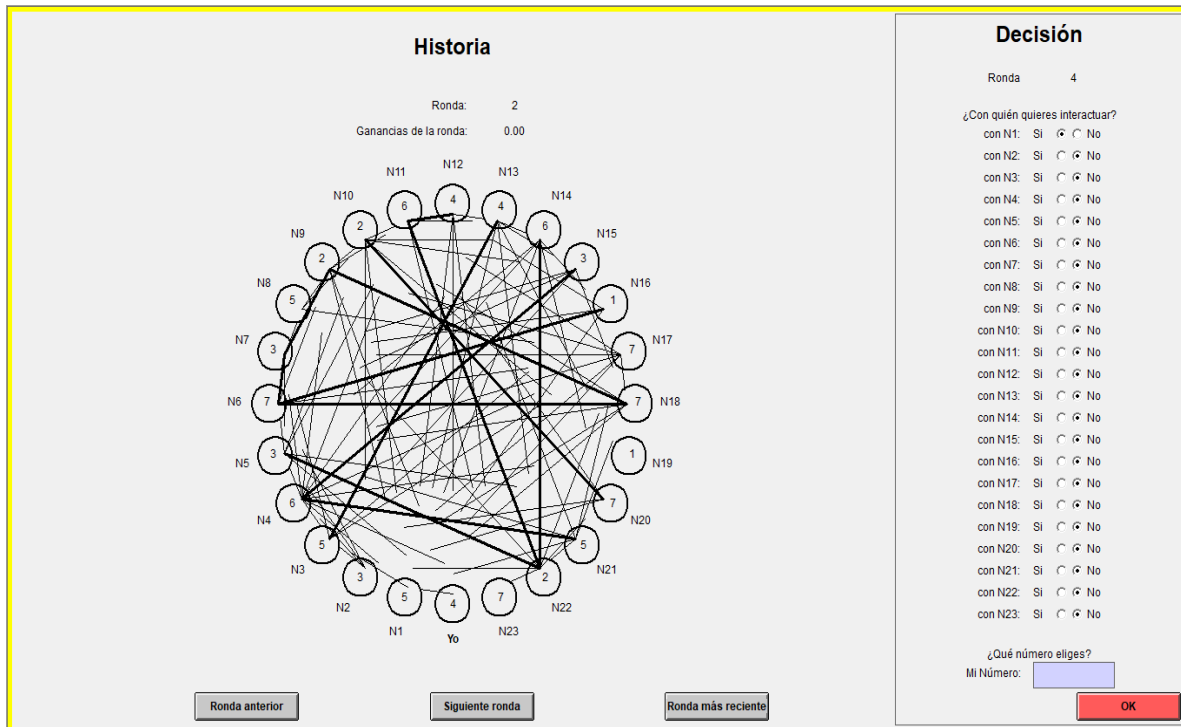
Suppose you have 23 neighbors in a round. You choose the number 6 and the lowest number chosen among your neighbors and you is 6. In this case, your earnings in this round will be: 23/23 * 120 = 120 points.

3· INFORMATION ABOUT COMPUTER SCREENS

During the experiment you will find screens similar to the one shown below:

The screen has two sections: **History and Decision**.

- **History:** This screen section provides you with information about the past rounds. At the beginning of each of the rounds, the History screen section will show you the information about the decisions made in the previous round, (in the screenshot example picture, the History screen section shows you the decisions made in the round 2; as you can check at the top). On the screen there are 24 circles, named **me, N1, N2,…, N23**. "me" always refers to you, while N1, N2, ..., N23 refers to the other 23 participants in the session.

  1. **A complete bold line** between two participants indicates that both participants have made a proposal for interacting with each other and have become neighbors. Consequently, they have interacted in the round in question (in the screenshot example picture, the line between **N9 and N18**).

2. **An incomplete line** between two participants indicates that only one of them has made an interaction proposal to the other. In this case, these two participants do not become neighbors and consequently do not interact with each other in the round in question. These lines originate in the circle of the participant who makes the interaction proposal and end just before the circle of the participant to whom the interaction proposal has been made (in the screenshot example picture, the line between **me** and **N1**. In this case, "**me**" proposes to interact with **N1**, but **N1** does not propose to interact to "**me**").

3. If no line is observed between two participants, this means that neither of them has made an interaction proposal to each other. Therefore they do not become neighbors and do not interact in the round in question.
4. Within the circles of each participant you can see the number, from 1 to 7, that each participant chose in the round in question (in the screenshot example picture, participants **N3** and **N8** chose the number 5 in round two, while participants **N6** and **N20** chose the number 7).
5. At the bottom of the screen you can see two buttons called **Previous round** and **Next round**. You can use these buttons to view information about the decisions made in each of the previous rounds. If you press the button **Most recent round** you will go directly to the information of the round before the current one.
6. **Your earnings** (in points) from each round are displayed at the top of the History screen section where the **earnings of the round** are indicated.

- **Decision:** This screen section shows the current round that is being carried out. This screen section is where you will have to make your own decisions in each round.

   1. "**Who do you want to interact with**? ": Following this question you can see the names of the other 23 participants (N1, N2,…, N23). You can propose an interaction with a specific participant by clicking "**Yes**" (first button), which is the button closest to the participant's name. If you do not want to interact with a participant or want to reject the interaction proposal of a participant, you must click the "**No**" button, the button furthest from the participant's name. **Note**: At the beginning of each new round, the buttons (interaction proposals) will appear in the same way as you selected them in the previous

round. In each of the rounds you can change your interaction decisions by clicking on the "Yes" and "No" buttons as explained above.

2. "¿**Which number do you choose? ":** At the bottom of the decision screen section, you will find a small cell called**" My number "**where you must enter the number of your choice each round.

Once you have made all your **decisions**, that is, the interaction decisions and the decision of the number, you must confirm your decisions by clicking the "**Ok**" button. Once the "Ok" button is clicked, you will not be able to go back and modify your decisions.

Note: At the end of each round, a screen will appear in which you will see to how many participants you have made an interaction proposal, how many participants have been your neighbors (that is, how many participants have you interacted with), your chosen number, the smallest number chosen by your neighbors and you, your earnings of the round and your accumulated earnings so far.

This is the end of the instructions. Now you must answer a series of questions to ensure that you have correctly understood these instructions. If you have any question, please raise your hand. When you finish answering the questions, raise your hand and the experimenter will come over to verify your answers and collect your instructions.

The experiment will begin when all participants have finished answering these questions. If you finish before the other participants, remain silent until the others finish.

Thank you very much.

4· CONTROL QUESTIONS

Which is your experimental code? (number of the computer you are using)

How many participants are in the session (not including yourself)?

Are they all the same participants throughout the whole experiment?

Using the screenshot example shown above, answer the following questions:

Which is the lowest number chosen by the session participants in round 2?

Which participants have chosen this number?

Which is the lowest number chosen by your neighbors and by yourself in round 2?

Which participants have chosen this lower number?

Who did you interact with in round 2? In other words, who were your neighbors?

Which participants made you an interaction proposal in round 2?

How many points did you earn in round 2?

A.2. Weak and Strong Identity Treatment experimental instructions

Aside from a couple of sentences indicated with "*", the only difference between experimental instructions of the Weak and Strong Identity treatments is that instructions of the "Stage 1" are not included in the Weak Identity Treatment. The rest of experimental instructions are exactly the same in both identity treatments.

General Instructions

Welcome and thank you for participating in our experiment. This experiment has the objective of studying decision making. In this experiment, your decisions will affect your earnings and the earnings of the other participants in this session. Throughout the entire experiment, which will last approximately 1.5 hour, your earnings will be counted in points. Points will be converted to Euros (€) at a ratio of:

<div align="center">

3 points = 1 € cent

</div>

At the end of the experiment, in addition to the € 5 for your participation, you will confidentially receive a **payment in cash for your accumulated earnings** throughout the entire experiment **(€)**.

It is important that you understand the rules of the experiment, so please read these instructions carefully. At the end of these instructions you will have to answer several questions to make sure that you have understood the experiment in which you are going to participate. When all participants correctly answer these questions, the experimenter will collect your instructions and the experiment will begin. At the end of the experiment, you will be asked to fill out a questionnaire, while the experimenter calculates the earnings in € of each participant.

During the experiment, communication between participants will only be allowed under the conditions specified in these instructions. Any other type of communication is not allowed and may lead to immediate expulsion from the experiment. The use of mobile phones is not allowed. You will not receive information about the real identity of the other participants either during the experiment or after the experiment. Likewise, the other participants will not receive information about your real identity.

If at any time you have a question, raise your hand and the experimenter will come over to resolve it privately.

Stage 1

Group selection

Inside the envelope that you have randomly chosen when entering the room, you will find a **green** or **blue** colored paper (do not open the envelope yet, the experimenter will indicate when you can open it). This paper will determine which **group** you will belong to throughout the entire experimental session, the green group or the blue group. **Do not** show this paper to any other participant. The participants that will belong to your group will be the same throughout the entire experimental session.

In this stage, each participant will carry out a joint task with **7** other participants from the **same group**. When the first stage begins, you will see in your computer screen a "**math puzzle**", **private information** about the "math puzzle" and a **chat box**.

In order to solve the enigma, you must **communicate** with the rest of your group members through the chat to share your private information. The chat is programmed in such a way that the participants of a group can only communicate with the other participants of their group. That is, when a participant in a group texts something in the chat, her message will only appear in the chat of the other participants who are her group members.

Your task in this stage is to **solve** the "**math puzzle**"

Once the "math puzzle" has been solved, you must write the solution, **numerically**, in the "**solution**" cell, and click the "**Ok**" button. Once the "Ok" button is clicked, you will not be able to go back to modify your answer. If you and all the members of your group enter the correct answer to the "math puzzle", **all** the members of the group will earn 450 points in this stage. You will have **7 minutes** to solve the "math puzzle". If you do not enter any solution before the time expires, or you enter an incorrect solution, your earnings and the earnings of the rest of your group members in this stage will be 0 points.

Now you can open the envelope and answer the following questions. **Do not** show this paper to any other participant:

What is your experimental code? (number of the computer you are using)
I am a member of the color group _____
I am not a member of the color group _____

Stage 2

In this experimental session there are **24 participants**, that is, there are 23 other participants besides you. Each participant is indicated with a letter and a number. You will receive the name "**me**". The other 23 participants will receive the names **N1, N2,…., N23**. The same name will always refer to the same participant throughout the entire experiment.

The experiment consists of **20 rounds** of the same game. In each of these rounds you can accumulate points. Your earnings during the experiment will be the sum of points you accumulate throughout the 20 rounds. At the end of the experiment, we will convert all the points you accumulate into **Euros (€)** at a ratio of 3 points = 1 € cent.

In each round, you and the other participants will have to make two decisions. The first **decision** is "**Who do you want to interact with?**", and the second **decision** is "**Which number do you choose?**". Both of your decisions, and the decisions of the other participants, will affect your earnings and the earnings of the other participants. These decisions that you will have to make are explained in detail below.

1· DECISIONS

Decision: "¿Who do you want to interact with?"

You must decide who you want to interact with in each of the rounds. You can **propose** an interaction to any other participant and you can propose as many interactions as you want (not proposing any interaction is also a valid option). Your interaction proposals, together with the interaction proposals of the other participants, will determine with whom you will interact in each of the rounds as follows:

- **You will interact** with another participant to whom you propose to interact **if and only if** that participant also proposes to interact with you. This means that **mutual consent is required** for the interaction between two participants to be effective.
- If a **mutual consent** for interacting between two participants **is not reached**, those participants **will not interact** in that round.

From now on, we will call the **participants you interact with: your neighbors**. Therefore, your neighbors will be those participants to whom, in a given round, you have made an interaction proposal, and at the same time, they have made an interaction proposal to you.

Decision: "¿Which number do you choose?"

In each round, each participant will choose a number from **1 to 7**. This is: 1, 2, 3, 4, 5, 6, or 7. **Your earnings** in each round will depend on:

4. The **number you choose**.
5. The **lowest number** chosen by **your neighbors and yourself**.
6. **The number of neighbors you have**.

112

You must choose **only one number** in each round. However, you can change your choices of who you want to interact with as well as the number chosen in each of the rounds.

This will be your payoff table expressed in **points**:

		Smallest number chosen by your neighbors and you						
		7	6	5	4	3	2	1
	7	130	110	90	70	50	30	10
	6	-	120	100	80	60	40	20
Your	5	-	-	110	90	70	50	30
chosen	4	-	-	-	100	80	60	40
number	3	-	-	-	-	90	70	50
	2	-	-	-	-	-	80	60
	1	-	-	-	-	-	-	70

Since your own decision of the number to choose can be a number from 1 to 7, the lowest number can be any number from 1 to 7. Your earnings in each round will be determined by the **cell** at the intersection of the row: "**Your chosen number**", and the column: "**Smallest number chosen by your neighbors and you**." Note that if your choice of "Your number" is 4, then the "smallest number by your neighbors and you" never could be a 5, or a 6, or a 7.

The points you will earn in each round will be those indicated in the payoff table, multiplied by: **number of neighbors / 23**. This aspect of the earnings is detailed in the examples that you will see below

For each participant in the experimental session that you do not interact with (participants who are not your neighbors) you will not get any profit. For example, if you don't have any neighbor in a round, your total earnings in that round will be 0 points.

2· EXAMPLES:

Suppose you have 12 neighbors in a round. You choose the number 3 and the lowest number chosen among your neighbors and you is 1. In this case, your earnings in this round will be: 12/23 * 50 = 26'08 points.

Suppose you have 23 neighbors in a round. You choose the number 5 and the lowest number chosen among your neighbors and you is 3. In this case, your earnings in this round will be: 23/23 * 70 = 70 points.

Suppose that in a round you have 9 neighbors. You choose the number 6 and the lowest number chosen among your neighbors and you is 4. In this case, your earnings in this round will be: 9/23 * 80 = 31'3 points.

Suppose you have 23 neighbors in a round. You choose the number 6 and the lowest number chosen among your neighbors and you is 6. In this case, your earnings in this round will be: 23/23 * 120 = 120 points.

Group Identity

Inside the envelope you have randomly chosen when entering the room, you will find a **green** or **blue** colored paper (do not open the envelope yet, the experimenter will indicate when you can open it). This paper will determine which **group identity** you will belong to throughout the entire experimental session, the green group or the blue group. **Do not** show this paper to any other participant. The participants that will belong to your identity group will be the same throughout the entire experimental session.

3· INFORMATION ABOUT COMPUTER SCREENS

During the experiment you will find screens similar to the one shown below:

The screen has two sections: **History and Decision**.

- **History:** This screen section provides you with information about the past rounds. At the beginning of each of the rounds, the History screen section will show you the information about the decisions made in the previous round, (in the screenshot example picture, the History screen section shows you the

decisions made in the round 2; as you can check at the top). On the screen there are 24 circles, named **me, N1, N2,…, N23**. "me" always refers to you, while N1, N2, ..., N23 refers to the other 23 participants in the session.

1. **A complete bold line** between two participants indicates that both participants have made a proposal for interacting with each other and have become neighbors. Consequently, they have interacted in the round in question (in the screenshot example picture, the line between **N9 and N18**).

2. **An incomplete line** between two participants indicates that only one of them has made an interaction proposal to the other. In this case, these two participants do not become neighbors and consequently do not interact with each other in the round in question. These lines originate in the circle of the participant who makes the interaction proposal and end just before the circle of the participant to whom the interaction proposal has been made (in the screenshot example picture, the line between **me** and **N1**. In this case, "**me**" proposes to interact with **N1**, but **N1** does not propose to interact to "**me**").

3. If no line is observed between two participants, this means that neither of them has made an interaction proposal to each other. Therefore they do not become neighbors and do not interact in the round in question.
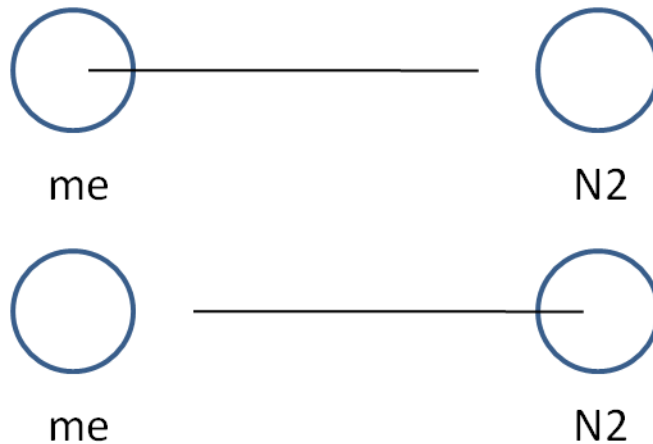4. Within the circles of each participant you can see the number, from 1 to 7, that each participant chose in the round in question (in the screenshot example picture, participants **N3** and **N8** chose the number 5 in round two, while participants **N6** and **N20** chose the number 7).
5. At the bottom of the screen you can see two buttons called **Previous round** and **Next round**. You can use these buttons to view information about the decisions made in each of the previous rounds. If you press the button **Most recent round** you will go directly to the information of the round before the current one.

6. **Your earnings** (in points) from each round are displayed at the top of the History screen section where the **earnings of the round** are indicated.

▪ **Decision:** This screen section shows the current round that is being carried out. This screen section is where you will have to make your own decisions in each round.

1. "**¿Who do you want to interact with? ":** Following this question, you can see the names of the other 23 participants (N1, N2,…, N23). You can identify which participants belong to **your group**, which participants belong to **the other group**, and which participants belong to **a group that is not shown** to you by looking at the color their names are written in. The participants whose name is displayed in black, are the participants whose group is not shown. The **participants in your group are the same participants** with whom **you developed the first stage** of the experiment.* You can propose an interaction with a specific participant by clicking "**Yes**" (first button), which is the button closest to the participant's name. If you do not want to interact with a participant or want to reject the interaction proposal of a participant, you must click the "**No**" button, the button furthest from the participant's name. **Note**: At the beginning of each new round, the buttons (interaction suggestions) will appear in the same way as you selected them in the previous round. In each of the rounds you can change your interaction decisions by clicking on the "Yes" and "No" buttons as explained above.

2. "**¿Which number do you choose? ":** At the bottom of the decision screen section, you will find a small cell called**" My number "**where you must enter the number of your choice each round.

Once you have made all your **decisions**, that is, the interaction decisions and the decision of the number, you must confirm your decisions by clicking the "**Ok**" button. Once the "Ok" button is clicked, you will not be able to go back and modify your decisions.

Note: At the end of each round, a screen will appear in which you will see to how many participants you have made an interaction proposal, how many participants have been your neighbors (that is, how many participants have you interacted with), your chosen number, the smallest number chosen by your neighbors and you, your earnings of the round and your accumulated earnings so far.

This is the end of the instructions. Now you must answer a series of questions to ensure that you have correctly understood these instructions. If you have any question, please raise your hand. When you finish answering the questions, raise your hand and the experimenter will come over to verify your answers and collect your instructions.

The experiment will begin when all participants have finished answering these questions. If you finish before the other participants, remain silent until the others finish.
Thank you very much.

* Sentence included only in the Strong Identity Treatment.

4· CONTROL QUESTIONS

Which is your experimental code? (number of the computer you are using)

How many participants are in the session (not including yourself)?

Are they all the same participants throughout the whole experiment?

Using the screenshot example shown above, answer the following questions:

Which is the lowest number chosen by the session participants in round 2?

Which participants have chosen this number?

Which is the lowest number chosen by your neighbors and by yourself in round 2?

Which participants have chosen this lower number?

Who did you interact with in round 2? In other words, who were your neighbors?

Which participants made you an interaction proposal in round 2?

How many points did you earn in round 2?

Which group do you belong to?

According to the screenshot example:

Which participants belong to your group? Did you develop the stage 1 task with them?*

Which participants belong to the other group? Did you develop the stage 1 task with them?*

Which participants do you not know which group they belong to? Did you develop the stage 1 task with them?*

* Sentence included only in the Strong Identity Treatment.

Appendix B

Table B.1: Exclusion rates in the first 10 rounds

t-1	Effort of i relative to effort of j and efforts in j's neighbourhood		
	e+	e-	e--
t	Exclusion rates		
Control	24.4%	28.5%	31.1%
	(6540)	(1211)	(924)
Weak	31.1%	27.3%	34.4%
	(6932)	(916)	(977)
Strong	13.3%	19%	18.1%
	(9836)	(242)	(525)
NT-XL	1.4%	45.8%	71.9%
	(8171)	(653)	(484)

Note: e+ denotes cases in which two participants *i* and *j* interact in the round *t−1* and subject *i* provides an effort at least as high as subject *j*; *e −* denotes cases in which subject *i* provides strictly less effort than a subject *j* but higher than the minimum effort in *j*'s interaction group in *t−1*; *e − −* denotes cases where a subject *i* provides strictly less effort than a subject *j* which is also equal or lower than the minimum effort in *j*'s interaction group in *t−1*.

When comparing the exclusion rates in the ten first rounds in the Strong and NT-XL treatments of e- and e- - categories, it can be observed that exclusion rates in the Strong Identity Treatment are much lower, 19% and 18.1%, respectively, as compared to in the NT-XL treatment 45.8% and 71.9%, respectively. Thus, there are much less cases of lower effort providers excluded in the Strong Identity Treatment. These differences might be due to the lower wasted efforts observed in the early rounds of Strong Identity Treatment in which the average minimum effort levels on interaction groups is higher than in the NT-XL treatment (depicted in Figures 2).

Table B.2: Effort reaction to exclusion rates in the first 10 rounds

t-1	Relative effort categories e- & e-- tohether	
t	excluded	non-excluded
t+1	*i*'s effort response (in %)	
Control		
ei ↑	61.9%	59.1%
ei=	12.8%	12.3%
ei ↓	25.3%	28.6%
Total cases	633	1073
Weak		
ei ↑	54.8%	47.8%
ei=	24.6%	30.8%
ei ↓	20.6%	21.3%
Total cases	586	895
Strong		
ei ↑	66.0%	75.9%
ei=	9.2%	5.8%
ei ↓	24.8%	18.3%
Total cases	141	328
NT-XL		
ei ↑	86.4%	86.8%
ei=	9.9%	8.5%
ei ↓	3.7%	4.5%
Total cases	647	480

Note: In panel $t + 1$, there are the percentage of e- and e- - cases in period $t – 1$, in which a participant increase, decrease, and keep constant its effort level, depending on whether being excluded or not in period t.

Table B.2. shows that in the NT-XL there are more cases of excluded, 647, than non-excluded, 480, participants, so there are more cases of excluded participants increasing their effort level (since the percentage of excluded and non-excluded participants oincreasing their effort level is similar, 86.4% and 86.8%, respectively). In contrast, and due to the exclusion rates in Table B.1. are lower, in the Strong Identity Treatment there are more cases of non-excluded, 328, than excluded, 141, participants. Furthermore, the percentage of non-excluded participants that increase their effort in period $t + 1$, 75.9%, is higher than the percentage of excluded participants increasing

their effort levels, 66%. Thus, in the Strong Identity Treatment, most participants increasing their effort in the early rounds do it so without the need to be previously excluded.

Appendix C

Table C.1 shows group identity saliency measures reported by participants in the final questionnaire. Participants were asked about how much they had felt identified with members of the same group identity, members of the different group identity, and in overall towards all participants in the experimental session, during and at the end of the experiment, in a scale from 1 to 5.

Table C.1: Group identity saliency degrees

During the experiment	Overall		in-group		out-group	
	Mean	St.dev.	Mean	St.dev.	Mean	St.dev.
control	3.18	1	-	-	-	-
weak	3	0.97	3.1 (0.0616)	1.14	2.8	1.1
strong	4.15	0.8	3.89 (0.2038)	0.98	3.68	1.1
At the end of the experiment	Overall		in-group		out-group	
	Mean	St.dev.	Mean	St.dev.	Mean	St.dev.
control	3.26	1.06	-	-	-	-
weak	3.1	0.98	3.1 (0.0665)	1.2	2.7	1.1
strong	4.17	0.8	3.93 (0.7090)	0.98	3.82	1.14

Note: The *p*-values for two-sided MW tests comparing in-group and out-group identity measures are reported in parenthesis.

Measures reported in Table C.1 show that identification degrees, during and after, towards in-group and out-group participants, are significantly higher in the Strong than in the Weak Identity Treatment (*p*=0.00) and (*p*=0.00), respectively. However, only in the Weak Identity Treatment participants felt, during and at the end, significantly more identified with in-group than with out-group participants, (*p*=0.06) and (*p*=0.06), respectively.

Appendix D

Figures D.1. show how the cumulative distribution of each effort level develops over rounds on each treatment. In these figures, different gray shades are used to depict each effort level frequency, from the darkest area representing the average frequency of the effort level 7 to the lightest area representing the average frequency of the effort level 1. In Figures D.1. it can be observed that the effort level of 7 is the effort level most frequently chosen in all treatments, although it is more frequently chosen, on average, in the Strong Identity Treatment (92%) than in the Control (67.8%) and Weak Identity treatments (70.7%).

Figures D.1: Cumulative distributions of effort levels

a) Control Treatment

b) Weak Identity Treatment

c) Strong Identity Treatment

d) NT-XL Treatment
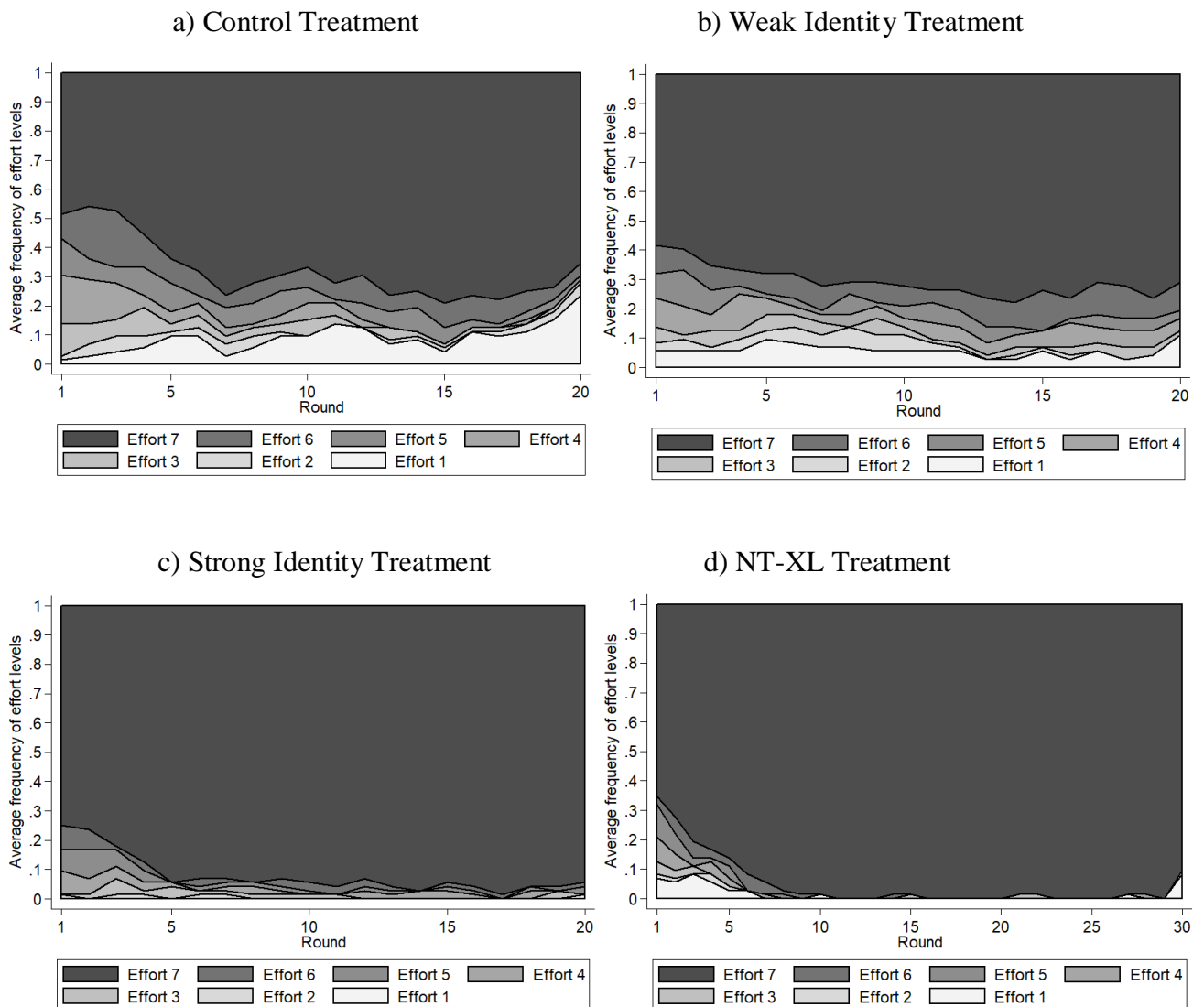
As Figure D.1. c) depicts, the frequency of the effort level 7 in the Strong Identity Treatment increases from 75% in the first round to more than 90% in the fifth round, percentage at which it stabilizes until the last round. When comparing this evolution with the evolution of the interaction frequency rates of each group identity category in the Strong Identity Treatment (Figure 4), we can observe a clear relationship. During the first five rounds, in which participants gradually increase their effort levels, differences between the interaction frequency rates of each group identity category gradually diminish. After that, more than 90% of participants constantly choose, round after round, the effort level of 7, and differences between the interaction frequency rates of each group identity category vanish almost by complete. These two correlated trends suggest that participants who previously chose the effort level of 7 interact among them regardless their group identities.

4

Staying Home: Discrimination and Selfishness in Pandemic Times

Abstract

The covid-19 pandemic declared in 2020 posed a global common threat that forced cooperation among individuals, communities, and governments to achieve the superordinate goal of reducing the spread of the covid-19 virus. This paper studies how redistribution and discrimination between members of different social groups in conflict evolved as the superordinate goal was gradually achieved in Spain. To do so, an online experiment was conducted along the "*unlockdown*" process implemented by the Spanish government at the beginning of summer 2020. Participants first chose whether to conduct the experiment in Catalan, Spanish or English, and then made five sets of redistribution decisions in a Dictator Game variation along six weeks in which they were gradually unlocked from their homes. Results show that participants became more selfish as they were gradually unlocked. Besides, participants who conducted the experiment in Spanish significantly increased their overall degree of discrimination along the "unlockdown" process, but not participants that conducted the experiment in Catalan or English. These results show discrimination and selfishness increased as the superordinate goal was gradually achieved, highlighting that superordinate goals mitigate discrimination and selfishness.

4.1. Introduction

Group identity is often argued to be an underlying factor of intergroup conflict initiation and escalation (Tajfel and Turner, 1979). On the other hand, interactions entailing cooperation to achieve common goals might effectively mitigate discrimination and prejudices between individuals from different social groups in conflict Allport (1954). Conflict between groups is a persistent phenomenon in human history. Conflict can emerge by disputes over scarce limited resources, through a fight on imposing values like culture, religion, and language, or by a combination of both structural and psychological factors (Sherif, 1966; Tajfel and Turner, 1979; Stephan and Stephan, 2000).[37] In some cases, conflicts lead to violent and bloody wars while in other cases conflicts had developed in a more subtle way and without physical violence. Whether a conflict is violent or peaceful, it always exacts human, social, and economic costs. It is therefore important to study which factors can mitigate ongoing intergroup conflicts and their dire consequences. This paper extends on the hypothesis that discrimination between members of social groups in conflict might attenuate through interactions to achieve superordinate goals and tests whether discrimination can also attenuate by superordinate goals not requiring interaction between individuals.[38] To do so, this paper presents an online experiment exploiting a natural occurring context in which the Covid-19 pandemic situation and the intergroup conflict between Catalans and Spaniards overlapped in time.[39]

There exists an extensive literature, especially in Social Psychology, studying interventions aimed at reducing and mitigating conflicts between different social groups.[40] Many of these interventions are rooted in the Intergroup Contact Theory proposed by Allport (1954) which held that, under specific conditions; equal group status, common goals, intergroup cooperation, and support of authorities, interactions between members of different social groups can reduce stereotypes and discrimination between them, hence preventing the emergence of new conflicts, or deescalating

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[37] See Böhm et al. (2018) for a review of theories on intergroup conflicts emergence and empirical measures used to assess conflict-related individual attitudes.

[38] Superordinate goals were defined by Sherif (1958) as "goals which are compelling and highly appealing to members of two or more groups in conflict but which cannot be attained by the resources and energies of the groups separately".

[39] Appendix A further introduces the recently evolution of the conflict between Catalans and Spaniards, and the idiosyncrasy of language diversity in Spain.

[40] See Pettigrew and Tropp (2006) for a meta-analysis on more than 500 studies testing the intergroup contact theory and Paluck and Green (2009) for a literature review.

ongoing conflicts. These conjectures are supported by the classic natural experiment of Sherif et al. (1961) in an Oklahoma summer camp for kids. In their experiment, known as Robbers Cave experiment, kids were first randomly assigned to one of two groups. Then, kids of each group developed a sense of group by interacting and living together for a week. After that, researchers introduced competitive activities between kids of the two groups. The competitive atmosphere led to conflicts that extended far beyond the competitive activities, resulting in behaviors intended to harm kids of the other group during the regular camp life. Finally, researchers tried to mitigate the conflict by putting in contact kids of the two groups under neutral conditions (without either a competitive or cooperative connotation). However, as later stressed by Pettigrew (1998), intergroup contact resulted in a failure on mitigating the conflict between the two groups of kids even exacerbating stereotypes and prejudices between them.[41] It was not until kids of the two groups had to cooperate in order to achieve superordinate goals that the conflict was attenuated.

After Akerlof and Kranton (2000) theoretically introduced the notion of identity into economic models, economist have also proposed models based on the two main sources originating intergroup conflicts, economic inequalities and group identity diversity (Basu, 2005; Esteban and Ray, 2011; Esteban et al., 2012). Within this economic literature there is also evidence on how intergroup contact affects discrimination, stereotypes and future interactions between members of different social groups. Some of these interventions had been implemented in college environments. For instance, Boisjoly (2006) exploit roommate random assignations among college students at Harvard, and found that after living with Afro-American roommates, white students reported in ex-post surveys more positive attitudes toward affirmative action policies and having more frequent social interactions with individuals from other ethnicities. Similarly, Corno et al. (2019) found that white students in a South African university reduced their negative stereotypes (measured using Implicit Association Test) and increased their interactions with students of other races after living with a roommate of a different race. Interestingly, the authors also found a positive effect on black students' academic performance derived from the intergroup contact as a roommate with white students. Black students in mix race rooms increased their average grades and the number of exams passed, and decreased their dropout rates. Also in a college

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[41] See Paolini et al. (2010) and Barlow et al. (2012) for studies testing the hypothesis that contact between individuals from different social groups might also increase negative stereotypes.

environment and as a result of a governmental policy in Delhi, Rao (2019) found that integrating poor students in rich student classrooms reduced rich students' discrimination against poor students, and made rich students volunteer in prosocial activities more and become more generous in laboratory Dictator Games.

Despite the vast literature studying intergroup contact as a mitigating factor of discrimination and stereotypes, there is a lack of evidence whether discrimination might attenuate without requiring individuals to get in contact. In particular, there is no evidence on whether superordinate common goals could reduce discrimination between members of social groups in conflict even if physical interactions do not occur among them. To the best of my knowledge, this paper presents the first experiment exploiting a naturally occurring context in which members of two social groups in conflicts see themselves exogenously forced "by the nature" to cooperate in order to achieve a superordinate common goal without physical interactions. Indeed, in this particular context the cooperation required to achieve the superordinate common goal consists on not interacting with other individuals.

Due to the emergence of the covid-19 virus in 2020, governments worldwide decreed lockdown policies to reduce the spread of the covid-19 virus. In most countries, citizens were locked down at home and restricted their social life and social contact with other people for months. In Spain, for instance, the Spanish government decreed the "state of alarm" to impose first a quarantine on all Spanish citizens and after to regulate at the national level when and how people's freedom of movement was going to be restored. This context offered an opportunity to investigate the role of superordinate goals alone, without interaction or contact between individuals, in reducing discrimination between members of two social groups currently in conflict, Catalans and Spaniards.

This paper presents an online experiment that takes advantage of the "unlockdown" process implemented at a national level in Spain through which the Spanish government managed Spanish citizens' freedom of movement from the beginning of May to the end of June 2020. The Spanish "unlockdown" process basically consisted on gradually increasing the freedom of movements of citizens in each Spanish region as the epidemiological context favorably progressed in each region. The Spanish "unlockdown" process offered a natural environment in which the collective perception of achieving the common goal of reducing the spread of Covid-19 virus in each region gradually increased as people were gradually "unlocked". However, although the threat

was common to all people living in Spain, there might be divergences on who had to get the command control to manage the measures to achieve the common goal. For instance, the presidents of some Spanish regions claimed for a decentralized command control at the regional level to adopt and adapt measures to each region's particularities. Along the Spanish "unlockdown" process, participants in the experiment played five times a modified version of a Take-or-Give Dictator Game (ToG henceforth) inspired in List (2007) and Bardsley (2008). In this version of the ToG game, groups of one dictator and four receivers are formed. The language each receiver chose to conduct the experiment is used as a group identity proxy and displayed to the dictator. In each group there is one receiver that chose to conduct the experiment in Catalan, another in Spanish, another in English, and another whose language chosen remained uncertain.[42] The dictator and the four receivers are endowed with the same amount of money. The dictator can either transfer any amount of its endowment by giving to any receiver, or by taking any amount of any receiver's endowment. Different to List (2007) and Bardsley (2008), any amount of money given or taken by the dictator is divided by two before arriving to the dictator or receiver. Imposing socially inefficient transfers and equal initial endowments to dictators and receivers allows us to disentangle between social welfare maximizing and inequity aversion preferences from other social preferences based on group identity. The unique equilibria for social welfare maximizer or inequity averse dictators is to retain the initial equal split of endowments, whereas dictators with preferences to benefit or harm a particular receiver will always have to do so at the expenses of a social welfare loss any transaction entails. Furthermore, self-maximization preferences are not compatible with social maximization preferences either since a dictator participant aiming to maximize its own profit by taking all receivers' endowment would cause the highest social cost.

The main findings of this paper are that superordinate common goals not requiring contact between individuals might be an effective tool to reduce discrimination and selfishness. Participants that chose Spanish language to conduct the experiment significantly increase their overall degree of discrimination as they were gradually "unlocked" and the superordinate common goal to slow down the covid-19 virus contagion was gradually achieved. However, there is no significant effect on the

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[42] Including receivers registered in English introduces the reference of out-group participants to whom there is no conflict connotation. Not revealing the registration language of one receiver allows for studying the effects of group identity uncertainty on redistribution decisions.

evolution of discrimination of participants who chose the Catalan and English language to conduct the experiment. Even more, participants who chose the Catalan language to conduct the experiment and declared to support Catalonia's independence discriminated significantly more than other participants. The second main result of this paper is that, overall, participants in each language decided to take more money from receivers than they gave to them, and this difference significantly increased throughout the Spanish "unlockdown" process. These results highlight superordinate goals as a mitigating factor of discrimination and selfishness.

This paper relates to several interrelated bodies of research. First, to the broad literature studying and implementing interventions aimed to reduce discrimination and prejudices between members of different social groups. This literature has grown and evolved since the classic field experiment of Sherif et al. (1961), and has focused more on whether the mere contact between individuals might be enough, and indeed has been found it is, to reduce negative stereotypes (Van Laar et al., 2005), the likelihood of discrimination (Rao, 2019), or increase trust (Finseraas et al., 2019), and future interactions (Boisjoly, 2006; Carrell et al., 2019; Corno et al., 2019), between members of different social groups. This paper adds to this literature by exploiting a natural context that forced members of different social groups, some of them in conflict, to achieve a superordinate common goal by restricting interpersonal contact. This context offers the opportunity to put the emphasis not in the contact between individuals but in the superordinate common goals as a mitigating factor of discrimination, and provide evidence that contact between individuals is not always an indispensable condition to reduce discrimination.

Second, this paper also contributes to the literature studying the common-enemy effects on individual preferences. The common-enemy effect refers to the effects on individual preferences when being confronted with a common threat stemming from a natural disaster or an intergroup conflict.[43] In this literature, there is evidence that individuals become more cooperative and pro-social with other group members when the social group is under threat or involved in a conflict with another social group (Bornstein and Ben-Yossef, 1994; Weisel and Zultan, 2016; Glynn et al., 2003; Penner et al., 2005). There is also evidence that natural disaster can increase cooperation (Whitt and Wilson, 2007; Solnit, 2010) and trust (Cassar et al., 2017) of individuals who

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[43] See De Jaegher (2021) for a review of multidisciplinary theoretical models of the common-enemy effects.

suffered the negative consequences of the disaster. This paper adds to this literature studying the effects of a common threat on discrimination between members of different social groups.

Finally, this paper also contributes to the recent literature addressing the effects of covid-19 pandemic on individuals worldwide. For instance, the results of the review and meta-analysis of Salari et al. (2020) show lockdowns imposed by governments caused negative psychological effects like stress, anxiety, and depression to people, and Cappelen et al. (2021) found the pandemic can increase individual moral views like solidarity in the sense of giving priority to social problems. This paper contributes to this emerging literature by investigating the evolution redistribution decisions of economic resources among individuals of different social groups during the Spanish "unlockdown" process, a period in which the collective perception of the common threat posed by the covid-19 virus was gradually decreasing.

The rest of the paper is organized as follows. In Section 4.2 the Spanish "unlockdown" process is explained and the experimental hypothesis presented. Section 4.3 contains the experimental design and procedures. In Section 4.4 results are presented, and Section 4.5 concludes discussing the results.

4.2. The Spanish "unlockdown" process and hypothesis

The first symptoms in humans infected by the covid-19 were detected by the Chinese healthcare authorities of Wuhan in late December 2019. Since then, the virus had spread worldwide causing hundreds of thousands of human deaths, most of them, old people suffering from previous diseases. Given the threat the virus did pose to people's health, the 11th March 2020 the World Health Organization declared the covid-19 outbreak as a global pandemic. At that moment, there were more than 118,000 cases diagnosed in more than a hundred countries, and more than 4,000 people had officially died due to an infection of covid-19.[44]

Although after the global pandemic was declared some governments did consider the strategy of letting the virus spread amongst its citizens in order to achieve herd immunity, most countries decided to fight against the virus trying to cut down its transmission amongst people. To do so, governments gave hygiene recommendations

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[44] https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

such as washing hands very often, wear a mask, and try to avoid touching one's face, eyes, and mouth. More importantly, some governments did implement quarantine to its citizens, restricting their movements to basic and essential activities like buying food in the supermarket and medicines in a pharmacy. For millions of people around the world, this was the first time in their lives that they saw their movements restrained in such a drastic way, thus increasing the sense of danger and threat. A threat, get infected, that was common for everyone, although its repercussions were known to be much catastrophic for older people and those who suffer from previous diseases.

The 14th of March 2020, the Spanish government decreed the "state of alarm" through which movement restrictions and quarantine were imposed to all Spanish citizens. The population segments considered essential workers for society's subsistence, like workers in the healthcare system and workers in the food and essential goods supply sector were allowed to keep developing their professional activity in person. However, workers from other economic sectors had to carry out their jobs remotely from home or stop working in case remote work was not possible. All local businesses, restaurants, shops, and schools were closed. Only supermarkets, food stores, and pharmacies remained opened. Citizens could leave home only to buy food and medicines, go to the hospital, take care of dependent and disabled people, and walk pets. While doing so, citizens were required to keep a physical distance of two meters from any other individual they encounter.

Once the number of new infection cases and deaths of covid-19 had continuously decreased for more than a month, the Spanish government designed a five stages "unlockdown" process that regulated and gradually increased citizens' mobility and social life, and economic activity. The last stage of the process was called "back to normality" and was supposed to restore citizens' mobility and economic activity fully. Figure 1, shows when the lockdown and the "unlockdown" process started and finished (back to normality) and the evolution of new cases of infection and deaths from covid-19 in Spain.

Figure 1: Beginning of covid-19 pandemic in Spain
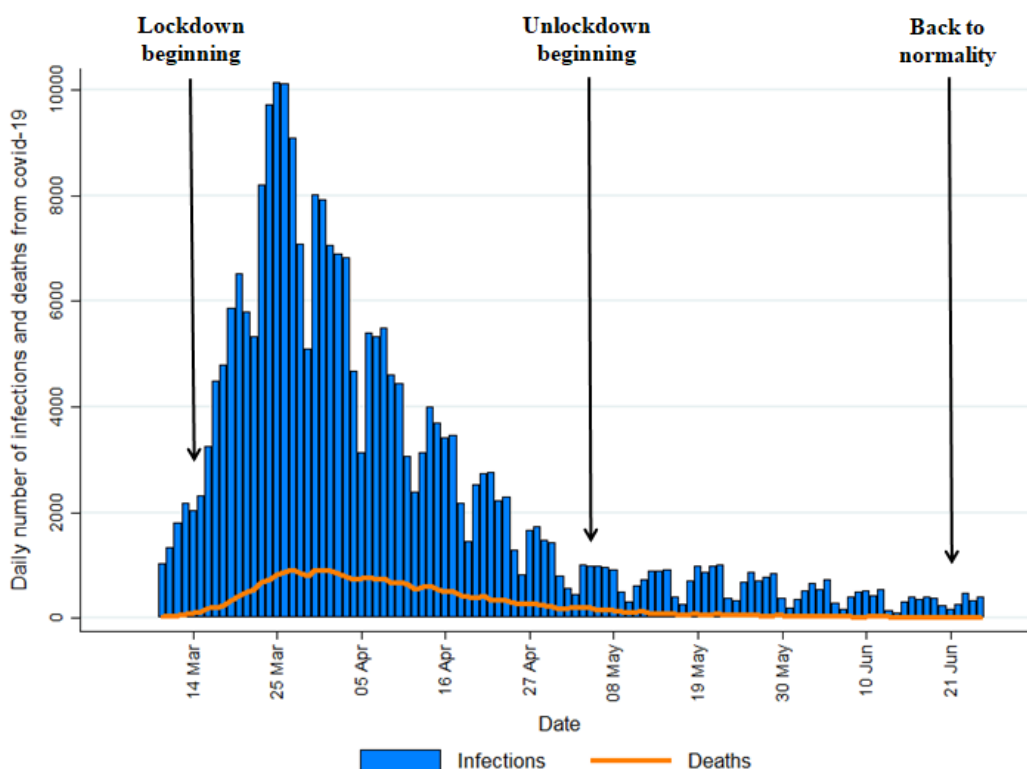
Note: The figure reports the number of new positive cases and deaths of covid-19 virus daily reported by Spanish authorities.

The "unlockdown" process design by the Spanish government was complex and included many measures that were modified during the process or adapted by the regional governments to the particularities of each region. Indeed, the regional subdivision of the territory was called healthcare regions. Table 1 shows the main measures adopted to regulate individuals mobility and bars and restaurants services.[45]

Table 1: Restriction measures imposed during the "unlockdown" process in Spain

	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4
Movility	·Municipal level.	·Healtcare region.	·Healtcare region.	·Healtcare region.	·Back to normality.
Activity	·Go out for a walk or doing some exercise at different day times depending on age. ·Attention to orchards. ·Pray at church. ·Only contact with cohabiting individuals.	·Groups of maximum 10 individuals. ·Cultural events with capacity restrictions.	·Groups of maximum 15 individuals. ·Marriages with capacity restrictions.	·Allowed contact between no vulnerable individuals without previous deseas.	·Back to normality.
Bars and Restaurants	·Take away service.	·Outside terraces service at the 50% of capacity, with a maximum of ten clients per table, and disinfecting	·Inside table service with capacity restrictions.	·Capacity restrictions are relaxed.	·Back to normality.

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[45]   See https://www.lamoncloa.gob.es/covid-19/Paginas/plan-transicion.aspx for all the official information about the "unlockdown" process implemented by the Spanish government.

Figure 2, shows when participants were required to make their decisions as dictators in the ToG game. It can be observed a decreasing trend on the number of new cases and deaths by covid-19 throughout the "unlockdown" process implemented by the Spanish government. Therefore, the superordinate common goal of slowing the spread of the virus was gradually achieved, which in turn implied a gradual reduction in the threat of being infected and dying by the covid-19 virus while participants were making their decisions. After receiving an e-mail, participants had five days to access a digital platform (Qualtrics) and make their redistribution decisions.

Figure 2: Decisions timeline
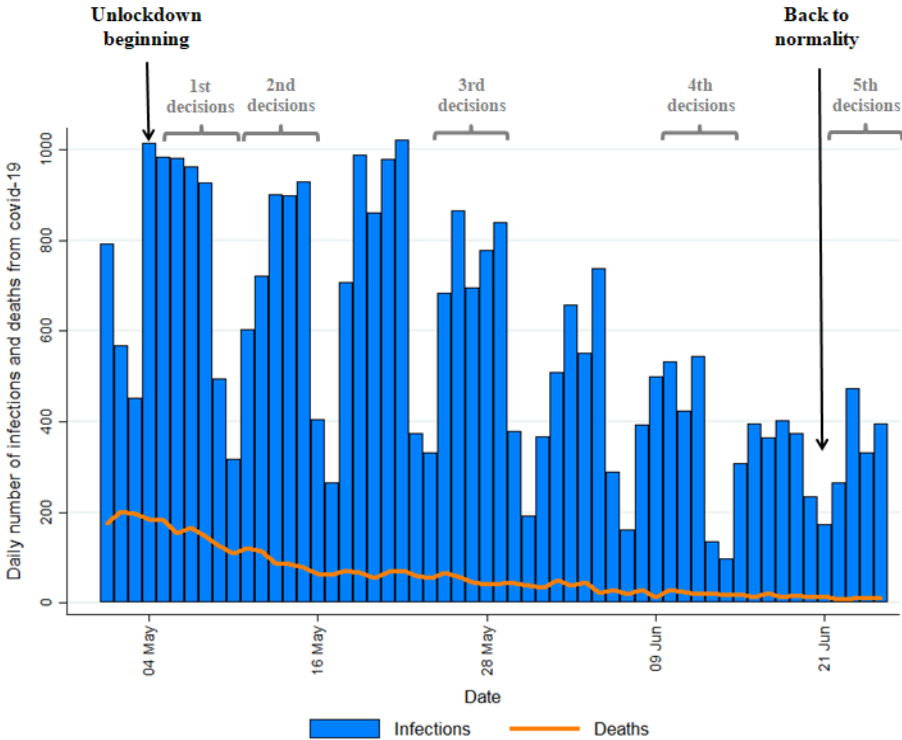
Note: The figure shows the five time periods in which participants were required to make their redistribution decisions as dictators.

All Spanish regions started the "unlockdown" process the 4th of May at stage 0. To move on from one stage to another, regions needed to request the central government the stage change providing a report on health, epidemiologic, economic, mobility, and social indicators at a regional level. The central government evaluated indicators of each request and allowed to implement the stage change in those regions with favorable evaluations. Not all requests were favorably evaluated, and therefore, there were regions advancing in the "unlockdown" process faster than others, resulting

in different "unlockdown" process stage sequence for citizens living in different regions (Appendix B shows which regions were created and when all stage changes were announced). Depending on the place participants were living during the "unlockdown" process they made each of their decisions in one or another "unlockdown" process stage and spend longer time under more or less strict restrictions. Although most participants in the experiment did experience the slowest stage sequence, it is worth so analyze if different "unlockdown" speeds had an effect on participant redistribution decisions. Table 2 shows the three different stage sequences experienced by participants and how many of them experienced each sequence.

Table 2: "Unlockdown" process stage sequences of participants

| | Decision | | | | | |
	1	2	3	4	5	Participants
Stage sequence	stage 0	stage 1	stage 2	stage 3	stage4	41
	stage 0	stage 0	stage 1	stage 2	stage4	498
	stage 0	stage 1	stage 1	stage 2	stage4	3

As a tool for organizing the results now the hypothesis of the experiment are presented. The main hypothesis of this experiment concerns to discrimination between individuals from different social groups, specially, between individuals of social groups in conflict. Based on previous evidence showing that cooperation to achieve common goals is crucial for interactions between members of different social groups to mitigate negative discrimination and stereotypes, the first hypothesis goes in the same line but ruling out the component of contact between individuals. Discrimination in the ToG game is measured as the difference between the redistribution decisions participants do toward the receiver registered in the same language and the other receivers. As shown before in Figure 2, participants made their redistribution decisions as the superordinate common goal was gradually achieve. Moreover, the degree of cooperation required through restricting movements' freedom decrease as participants were gradually "unlocked" and moved on through the "unlockdown" process stages. Hence, participants made their decisions in a sequence from high cooperation demanding context to low cooperation demanding context to achieve a superordinate common goal. Then, if superordinate common goals play a role in mitigating discrimination between individuals, it would be expected participants discriminate less in their first decisions

when they are further to achieve the superordinate common goal than in their later decisions when they are closer to achieve it.

Hypothesis 1: *Discrimination between participants gradually increases as the superordinate common goal is gradually achieve, specially, between participants of social groups in conflict.*

The second hypothesis relates purely to the overall redistribution decisions of participants. Participants can either take money from receivers in order to increase their payoffs or give money to any receiver, which decreases their payoffs. Each time participants play the ToG game the initial endowments of the dictator and receivers are the same (wich rules out inequity aversion reasons to do any transfer) and any money transfer entail a social cost (which also rules out social welfare maximization reason to do any transfer). Therefore, the second hypothesis concerns whether participants will exhibit altruistic preferences and will give more money to the receivers than that they will take, or the opposite will happen, and self-interested preferences will prevail.

Hypothesis 2: *Overall, participants take more money from receivers than that given to them.*

Furthermore, it is not clear whether overall redistribution preferences will be affected by the gradually consecution of a superordinate common goal. However, in the same line as the argument exposed for discrimination, cooperation degrees might be positively correlated with generosity and altruism, whereas negatively correlated with self-interes and selfishness.

Hypothesis 3: *Assuming participants are selfish, the degree of selfishness increases as the superordinate common goal is gradually achieved.*

These three hypotheses are going to be tested both at aggregate level and separately for participants that registered in each language.

136

4.3. Experimental design, procedures, and descriptive statistics

4.3.1. The Take or Give Dictator Game

Participants play the ToG Dictator Game inspired by Dictator Games used in List (2007) and Bardsley (2008) once in each of five time periods $p = \{1, 2, 3, 4, 5\}$. In each period, the endowments (e) of dictators and receivers were all set at € 100. Participants decide each period as dictators how to redistribute their own endowment and the endowment of four receivers $r = \{1, 2, 3, 4\}$. To redistribute endowments, dictators can give any amount of their endowment to any receiver $g_r = [-100, 0]$ imposing $\sum_{r=1}^{4} g_r \geq -100$, or take any amount of the endowment of any receiver $t_r = [0, 100]$. Dictators cannot simultaneously give and take from the same receiver, and therefore, if $g_{rp} \neq 0$ then $t_{rp} = 0$, and vice versa. The amount of money transferred by any giving or taking decision is divided by two before arriving at the dictator or the receiver. Dictators are informed about the language each receiver has chosen to conduct the experiment. Each period, all dictators decide regarding one receiver who chose the Catalan language (C), another that chose the Spanish language (S), another that chose the English language (E), and another that it is not known the language s/he chose (U). The following equation represents the payoff function of a dictator d in period p:

$$\pi_{dp} = e_{dp} + \sum_{r=1}^{4} g_{rp} + \frac{\sum_{r=1}^{4} t_{rp}}{2} \tag{1}$$

Similarly, the payoff function of a receiver r in period p is represented by:

$$\pi_{rp} = e_{rp} - \frac{g_{rp}}{2} - t_{rp} \tag{2}$$

Models assuming pure rationality and selfish preferences predict dictators would take all receivers' endowment to maximize their profits. However, models assuming other-regarding or social preferences (Fehr and Schmidt, 1999; Bolton and Ockenfels 2000) had been shown to better explain behaviors observed in Dictator and Allocation games. Unlike other Dictator Games that are zero-sum games, giving and taking decisions reduce the overall amount of money, and therefore are socially inefficient. Consequently, identity-based preferences (treat differently the in-group than the out-group members) always entail a social cost and cannot be simultaneously fulfilled with

social welfare maximizing preferences. Furthermore, dictator and receivers' initial endowments are the same, making it impossible to fulfill identity-based preferences and full inequity aversion preferences simultaneously. These experimental features allow for distinguish dictators with stronger concerns for social efficiency or inequity from those with stronger identity-based preferences. Besides, combining both giving and taking decisions with multiple receivers with different group identity, we can distinguish between discrimination patterns in the negative margin (e.g., dictators taking different amounts from receivers), in the positive margin (e.g., dictators giving different amounts to receivers), and discrimination patterns not, or rarely, explored combining both positive and negative domains (e.g., taking from the out-group to give to the in-group).

4.3.2. Procedures

Participants were electronically recruited from the experimental subject pools in ESADE Business School (Universitat Ramon Llull), Universitat Pompeu Fabra (UPF), Universitat Autònoma de Barcelona (UAB), and through social networks (Twitter). An invitational e-mail through ORSEE (Greiner, 2004) was sent to all individuals registered in the experimental subject pools of UAB and UPF, and through SONA to all individuals registered in the experimental subject pool of ESADE. The invitational e-mail sent was trilingual (written in Spanish, Catalan, and English), and provided three different links to choose in which language to conduct the experiment. Three consecutive tweets, one in each language, were posted on twitter. Each twit contained three registration links to register in the experiment in the preferred language. See the invitational e-mail sent and the twits posted in the Appendix C.

When clicking one of the three links to enroll in the experiment, participants were redirected to the Qualtrics digital platform. Participants first filled in a questionnaire in which they answered demographics questions, their knowledge level of the three languages, and their attitudes toward a redistribution policy and the conflict between Catalans and Spaniards. Participants were also required to provide a contact e-mail address to receive the links to make their future decisions. After answering the preliminary questionnaire the experimental instructions were presented to participants.[46] Participants were provided the experimental instructions explaining the Take or Give Dictator Game, how to make their decisions in the digital interface, and the

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[46] See the preliminary questionnaire and the experimental instructions in Appendix D.

experiment's payoff structure. Participants were told that at the end of the experiment seven participants will be randomly selected to be paid for one of their five redistribution decisions as dictators, which also will be randomly selected.[47] Participants were also told that twenty-four more participants would be randomly selected to become the receivers of the seven dictators previously selected.[48] Among the 35 participants randomly selected to be paid, the maximum payment was € 300 and the minimum €0 with an average of €83.

4.3.3. Descriptive statistics

In the preliminary questionnaire, participants were asked to report basic demographics that could affect their redistribution decisions like age, gender, place of birth, and whether they were students or not. Participants were also asked where they were currently living at the moment of registering in the experiment to identify which participants were going to experience the Spanish "unlockdown" process and which mobility restrictions they were going to deal with. This information is used to create the "unlockdown" process stage sequence of each participant. To check if participants would not be able to conduct the experiment in a particular language due to a lack of knowledge, they were also required to report their knowledge level (on a scale from 0 to 10) of Catalan, Spanish, and English languages. Participants also reported if they were living with kids and dependent persons since mobility restrictions were a bit flexible with people in such cases. Finally, the preliminary questionnaire included two questions directly related with the intergroup conflict between Catalans and Spaniards and one question about individual redistribution preferences at social level. Participants were asked their attitude, in favor, against, or do not care, about the self-determination right of Catalans, the independence of Catalonia, and regarding the implementation of a universal basic rent in their country. The two questions about the intergroup conflict allow for analyzing differences in discrimination patterns between participants with different attitudes towards the conflict, whereas the question about a basic rent allow to identify participants that supposedly hold stronger prosocial preferences.

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[47] This payoff structure introduces uncertainty on whether participants will be paid or not, which might potentially affect their decisions. See Ben-Ner et al. (2008) for a comparison between individual decision making in Dictator Games with real and hypothetic economic incentives.

[48] The fact that participants can be selected to be paid either as dictators or receivers entails role uncertainty. Iriberri and Rey-Biel (2008) study how dictator and receiver role uncertainty in Dictator Games can affect experimental participants' decisions as a dictator.

Table 3 shows descriptive statistics reported by the 2,139 participants successfully register in the experiment (in parenthesis), and the 543 participants living in Spain during the Spanish "unlockdown" process that completed the experiment making their five redistribution decisions (33 participants living out of Spain during the experiment also completed their five redistribution decisions).

Table 3: Descriptive Statistics

		Language of registration		
	Overall	Catalan	Spanish	English
	Mean	Mean	Mean	Mean
Age	24.5 (24.9)	23.9 (23.7)	25.67 (26.7)	25.79 (25.42)
Female	59.7% (56.4%)	61.6% (61%)	57.4% (52%)	50% (44.6%)
Student	74.4% (72.9%)	75.3% (75.5%)	72.1% (66.6%)	79.2% (78.8%)
Born in Catalonia	71.2% (69.4%)	89.3% (88.2%)	43.7% (45.8%)	29.2% (27.7%)
Living in Catalonia	88.6% (91.2%)	97.6% (98.8%)	72.1% (73.3%)	87.5% (88.1%)
Knowledge of Catalan	8.35 (7.69)	9.64 (9.54)	6.62 (6.18)	3.42 (2.09)
Knowledge of Spanish	9.59 (9.27)	9.60 (9.55)	9.86 (9.68)	7.25 (6.28)
Knowledge of English	7.63 (7.65)	7.53 (7.51)	7.57 (7.42)	9.29 (9.25)
In favor of a universal basic rent	69.4% (67%)	73.2% (71.2%)	64.5% (60.8%)	54.2% (63.3%)
In favor of Catalan's self determination right	83.4% (79%)	92.9% (89.62%)	69.4% (66.6%)	58.3% (59.1%)
In favor of Catalonia's Independence	40.5% (37.8%)	58% (56.4%)	11.5% (11.5%)	16.7% (18.7%)
Living with kids	4.8% (5.4%)	4.1% (4.1%)	6% (7.9%)	4.1% (4.6%)
Living with a dependent	3.7% (4.9%)	4.7% (4.1%)	2.2% (5.2%)	0% (0.8%)
Observations	543 (2139)	336 (1220)	183 (708)	24 (211)

Note: The table reports descriptive statistics of the 543 participants living in Spain that completed the experiment. Knowledge of each language was reported by participants in a scale from 0 to 10. Descriptive statistics of all participants registered in the experiment are reported in parentheses.

Among the 543 participants living in Spain during the "unlockdown" process and completed the experiment, 336 chose the Catalan language when registered for the experiment, 183 the Spanish language, and 24 the English language. The average age of these participants is 24.5 years, almost 60% are female, almost three-quarters of them

were students, and 88.6% were living in Catalonia while participating in the experiment (the remaining 11.4% were living in other Spanish regions). The only participants who saw their choice of language conditioned by a lack of language knowledge were participants registered in English, who reported an average knowledge of Catalan language lower than 5 on a scale from 0 to 10. The majority of participants, regardless which language they chose to conduct the experiment, declared to be in favor of implementing a universal basic rent in their countries and the self-determination right of Catalans. The greatest difference between participants occurs in their attitude toward the independence of Catalonia. While 58% of participants registered in Catalan report to favor the independence of Catalonia, only 11.5% and 16.7% of participants registered in Spanish and English, respectively, reported being in favor of Catalonia's independence.

4.4. Results

This section investigates whether superordinate common goals without contact between individuals might be an effective tool to reduce discrimination, and its effects on redistribution decisions. First, the evolution of redistribution decisions and discrimination patterns throughout the "unlockdown" process implemented by the Spanish Government is analyzed at the aggregate level, and then, separately for participants who chose Catalan, Spanish, and English language when registering for the experiment. Only the 543 participants that were living in Spain during the "unlockdown" process and completed the experiment are included. Participants not living in Spain during the experiment, and therefore did not experience the Spanish "unlockdown" process, are not included in the analysis.

4.4.1. Evolution of redistribution decisions and discrimination patterns at aggregate level

There are a 6.4% of participants with purely self-interested preferences that always maximize their own payoff and take all the endowment of receivers. A 9.5% of participants have social welfare maximizing or fully inequity aversion preferences and never transfer any amount of money maintaining always the initial split of endowments. A 1.1% of participants exhibited pure altruistic preferences and equally split their whole endowment among the four receivers always. Hence, at least 17% of participants never discriminate and the pandemic context did not influence their redistribution preferences.

A 46.7% of participants have identity-based component in their redistribution preferences and differently redistribute initial endowments amongst receivers depending on their own and receivers' social identity. Identity-based preferences are defined as preferences for a different treatment to other participants based on social identities. Hence, identity-based preferences always entail some kind of discrimination. The remaining 36.3% of participants did not consistently exhibit any of these types of preferences in all their five redistribution decisions.

Table 4 reports the average of overall redistribution, discrimination, and earnings of dictators by "unlockdown" process stages. The variable earnings is defined by the payoff function of equation (1) previously provided in *section 3.1*. The overall redistribution variable (ψ) is the difference between the sum of the dictators' endowment given to any receiver and the amount of endowment taken from any receiver. Therefore, overall redistribution of each dictator in each period is given by the following equation:

$$\psi_{dp} = \sum_{r=1}^{4} g_{rp} + \sum_{r=1}^{4} t_{rp} \tag{3}$$

Note that when a dictator takes more money from receivers than that given to them the value of the redistribution variable is negative. The overall discrimination variable (φ) of a dictator is equal to the sum of the discrimination against receivers registered in a different language (including the receiver that it is not known which language chose to register in the experiment). Using the case of a dictator that chose the Catalan language to register in the experiment as an example that extrapolates to dictators that chose Spanish and English as a registration language, discrimination in a particular period against the receiver registered in Spanish is defined by:

$$\varphi_{dCp}^{S} = \left[\left(g_{rp}^{C} + t_{rp}^{C}\right) - \left(g_{rp}^{S} + t_{rp}^{S}\right)\right] \tag{4}$$

Discrimination in a particular period against the receiver registered in English is defined by:

$$\varphi_{dCp}^{E} = \left[\left(g_{rp}^{C} + t_{rp}^{C}\right) - \left(g_{rp}^{E} + t_{rp}^{E}\right)\right] \tag{5}$$

142

Discrimination in a particular period against the receiver whose language chosen when registered for the experiment remains unknown:

$$\varphi_{dCp}^{U} = \left[\left(g_{rp}^{C} + t_{rp}^{C} \right) - \left(g_{rp}^{U} + t_{rp}^{U} \right) \right] \tag{6}$$

Therefore, the overall discrimination of a dictator that chose the Catalan language to register in the experiment is defined in each period by:

$$\varphi_{dCp} = \varphi_{dCp}^{S} + \varphi_{dCp}^{E} + \varphi_{dCp}^{U} \tag{7}$$

The number of observations reported in Table 4 for each "unlockdown" process stage is different. This is due to some Spanish regions, among which there were the regions were most participants in the experiment were living, remained longer in stage 0 at the beginning of the "unlockdown" process and move directly from stage 2 to stage 4 at the end.

Table 4: Evolution of redistribution and discrimination at aggregate level

	Overall redistribution	Overall discrimination	Overall earnings	
	Mean	Mean	Mean	Obs.
Overall	-59.55€	32.43€	115.37€	2,715
	(132.62)	(96.66)	(75.17)	
Stage 0	-50.81 €	29.99 €	111.30 €	1,040
Stage 1	-60.36 €	30.29 €	115.68 €	545
Stage 2	-62.93 €	37.13 €	116.52 €	542
Stage 3	-76.68 €	57.07 €	127.56 €	41
Stage 4	-72.06 €	32.98 €	121.63 €	542

Note: The table reports the average redistribution, discrimination, and earnings by "unlockdown" process stages. Standard deviations of overall means are reported in parenthesis.

The overall redistribution mean is € -59.55, which means that on average, dictators took, in total, almost sixty Euros more than that they gave to their receivers each time they played the ToG game. The overall dictators' earnings are € 115.37. These results supports Hypothesis 2 and points out that, overall, participants in the experiment are selfish. The overall discrimination mean is € 32.43, which means that on

average, the difference in redistribution decisions towards receivers registered in the same language as the dictator and the other receivers is slightly higher than thirty Euros. To test if these trends follow a significant ascending or descending trend, a regression analysis is conducted.

Table 5 shows an OLS regression analysis on overall redistribution decisions and discrimination, including all control variables obtained from the preliminary questionnaire clustering standard errors at participant level. The dependent variables are *Redistribution* in column 1 and *Discrimination* in column 2. *Stage* is the "unlokdown" process stage of the region where a participant was living when making his/her decisions. *Last movers* is a dummy variable that takes the value of 1 if the region were a participant lives is a most backward region in the "unlockdown" process, and 0 otherwise. *Universal basic rent* is a dummy variable that takes the value of 1 if a participant declared to be in favor of implementing a universal basic rent in his/her country and 0 otherwise. *Independence of Catalonia* is a dummy variable that takes the value of 1 if a participant declared to be in favor Catalonia's independence and 0 otherwise. *Self determination* is a dummy variable that takes the value of 1 if a participant declared to be in favor of the self-determination right of Catalans and 0 otherwise. *Age* is the age of participants. *Student* is a dummy variable that takes the value of 1 for student participants and 0 otherwise. *Dependent/Kids* are dummy variables that take the value of 1 for participants living with dependent/kids persons and 0 otherwise. *Gender* is a dummy variable that takes the value of 1 for female participants and 0 for male participants.

As shown in Table 5, participants in the experiment became gradually more selfish as they moved on throughout the "unlockdown" process stages, as shows the negative and statistically significant coefficient of the *Stage* variable in column 1. Participants who declared to be in favor to implement a universal basic rent in their country were significantly less selfish since the coefficient of *Universal basic rent* is positive and statistically significant. Finally, women are significantly less selfish than men, which is in line with results found in Eckel and Grossman (1998).

144

Table 5: Regression analysis at aggregate level

Variables	(1) Redistribution	(2) Discrimination
Stage	-5.96***	1.44
	(0.98)	(1.06)
Last movers	-6.96	0.78
	(4.82)	(3.81)
Universal basic rent	23.72**	-20.29**
	(12.06)	(8.28)
Independence of Catalonia	-2.74	16.99**
	(11.73)	(6.81)
Self determination	-5.24	-5.02
	(14.28)	(9.05)
Age	1.07	-0.47
	(0.85)	(0.45)
Student	-10.08	7.47
	(14.11)	(8.20)
Dependent	-14.40	1.63
	(32.61)	(11.18)
Kids	-15.35	48.21***
	(24.24)	(17.68)
Gender	25.78**	-13.29**
	(11.21)	(6.76)
Constant	-91.66***	52.90***
	(31.08)	(18.36)
Observations	2695	2695

Note: Robust standard errors, clustered at the participant level, are reported in parentheses with *** p<0.01, ** p<0.05, and * p<0.1.

These results supports Hypothesis 3 at aggregate level since, in overall, participants became more selfish as the superordinate common goal to fight against the covid-19 virus was gradually achieved. This result suggests that superordinate common goals alone, without contact between individuals, are able to attenuate individuals' self-interest preferences. However, during the "unlockdown" process implemented by the Spanish government individuals' freedom of movement increases at the same time the threat posed by the virus decreased. It is therefore not clear (and might not be possible to disentangle in this experiment) whether participants became more selfish along the "unlockdown" process because they perceived less threatened, or because their opportunities to spend money increased as their freedom of movement and leisure activities increased. Another economic factor that could have contributed to this evolution of redistribution decisions found is the bad economic forecasts for the future that were made public in those days.

Regarding discrimination, the *Stage* variable is not statistically significant. However, the attitude towards Catalonia's independence and implementing a universal basic rent significantly affected participants' discrimination. Participants in favor of a universal basic rent in their countries discriminate, on average, by twenty Euros less as compare to other participants. The redistribution decisions of participants in favor of Catalonia's independence were, on average, almost twenty Euros higher towards the receivers who were registered in the experiment in the same language as compared to those receivers who did not. Participants living with kids discriminate considerable more than participants who do not, and women discriminate significantly less than men. Therefore, there is no evidence supporting hypothesis 1 at aggregate level.

4.4.2 Redistribution and Discrimination of Catalans, Spanish, and English

Next, the hypothesis that superordinate goals attenuate selfishness and discrimination between members of different social groups, especially between members of social groups in conflict is tested. This section investigates redistribution and discrimination decisions throughout the Spanish "unlockdown" separately for participants that chose different languages to conduct the experiment. Table 6 and Table 7 report the average redistribution decisions and discrimination of participants registered in each language by "unlockdown" process stages. Again, and as a consequence of the asymmetric implementation of the "unlockdown" process across Spanish regions, the number of observations for participants registered in each language varies across "unlockdown" process stages.

Table 6: Redistribution evolution of participants registered in each language

| | Language of registration | | | | | |
| | Catalan | | Spanish | | English | |
	Mean	Obs.	Mean	Obs.	Mean	Obs.
Overall	-57.28€ (133.46)	1680	-60.77€ (130.83)	915	-82.05€ (133.32)	120
Stage 0	-48.39 €	655	-52.01 €	338	-75.91 €	47
Stage 1	-60.91 €	337	-56.10 €	184	-85.25 €	24
Stage 2	-60.74 €	335	-64.04 €	183	-85.08 €	24
Stage 3	-79.69 €	13	-77.62 €	27	-12.00 €	1
Stage 4	-68.64 €	335	-75.87 €	183	-90.75 €	24

Note: The table separately reports the average redistribution of participants registered in the experiment in each language by "unlockdown" process stages. Standard deviations of overall means are reported in parenthesis.

146

The mean of redistribution decisions made by participants registered in Catalan is € -57.28, which is significantly lower than that of the participants registered in Spanish, € -60.77 (*p-value* = 0.04),[49] and that of participants registered in English, € -82.05 (*p-value* = 0.00). Although not included in the table, the overall earnings for participants registered in each language are higher than € 100, which support hypothesis 2 for participants registered in each language.

Table 7: Discrimination evolution of participants registered in each language

	Language of registration					
	Catalan		Spanish		English	
	Mean	Obs.	Mean	Obs.	Mean	Obs.
Overall	37.88€ (92.46)	1680	22.13€ (101.99)	915	34.72€ (106.42)	120
Stage 0	36.07 €	655	16.62 €	338	41.36 €	47
Stage 1	40.83 €	337	13.07 €	184	14.24 €	24
Stage 2	42.09 €	335	27.26 €	183	43.25 €	24
Stage 3	45.23 €	13	67.26 €	27	-64.00 €	1
Stage 4	34.47 €	335	29.64 €	183	37.75 €	24

Note: The table separately reports the average discrimination of participants registered in the experiment in each language by "unlockdown" process stages. Standard deviations of overall means are reported in parenthesis.

The mean discrimination of participants registered in Catalan is 37.88, which is significantly higher than that of the participants registered in Spanish, 22.13 (*p-value* = 0.00), and similar than that of participants registered in English, 34.72 (*p-value* = 0.25). Again, to test if these redistribution decisions and discrimination levels follow a significantly increasing or decreasing trend over "unlockdown" process stages a regression analysis is conducted.

To test if these trends follow a significant ascending or descending trend for each set of participants that chose a particular language when registered in the experiment, a regression analysis is conducted. Table 8 shows an OLS regression analysis of participants that chose the Spanish language when registered for the experiment. The dependent variable in column 1 is *Redistribution*, in column 2 it is the overall *Discrimination*, *Discrimination* toward participants that chose different languages to

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[49] To compare the redistribution and discrimination averages of participants registered in different languages, a non-parametric two-sided Mann-Whitney test is used with participants as a unit of observation.

register in the experiment are the dependent variables in column 3 and 4, and *Discrimination* toward participants whose registration language is not known in column 5. Again, independent variables include *Stage* and *Last movers* variables, and all control variables obtained in the preliminary questionnaire. Standard errors are clustered at participant level.

Table 8: Regression analysis of Spanish participants

Variables	(1) Redistribution	(2) Discrimination (overall)	(3) Discrimination (Catalans)	(4) Discrimination (English)	(5) Discrimination (Unknown)
Stage	-5.93***	4.26**	1.13	1.39*	1.73**
	(1.74)	(1.95)	(0.73)	(0.76)	(0.74)
Last movers	0.60	1.08	2.68	0.14	-1.73
	(9.64)	(8.14)	(3.08)	(3.06)	(3.12)
Universal basic rent	-6.59	-23.86*	-10.67**	-7.01	-6.17
	(17.86)	(13.60)	(5.21)	(5.31)	(4.82)
Independence of Catalonia	-33.24	-35.43**	-13.92	-2.78	-18.73***
	(36.46)	(17.78)	(8.62)	(6.91)	(5.51)
Self determination	-1.87	-12.03	-3.36	-4.58	-4.08
	(19.21)	(12.75)	(4.77)	(4.95)	(4.72)
Age	1.32	0.17	0.50	0.06	-0.39
	(1.36)	(0.77)	(0.37)	(0.28)	(0.34)
Student	-30.25	14.14	12.29**	0.80	1.04
	(22.62)	(14.27)	(6.22)	(5.73)	(5.19)
Dependent	9.39	2.65	6.43	-10.07	6.28
	(88.07)	(20.49)	(10.80)	(6.11)	(6.45)
Kids	-65.68	50.51*	13.26	18.48	18.76
	(41.89)	(29.91)	(13.77)	(13.20)	(12.49)
Gender	48.03***	-9.78	-5.08	-4.05	-0.64
	(18.73)	(11.56)	(4.37)	(4.66)	(4.11)
Constant	-78.98	30.86	-6.20	15.47	21.60*
	(48.29)	(29.26)	(13.03)	(10.98)	(11.61)
Observations	915	915	915	915	915

Note: Robust standard errors, clustered at the participant level, are reported in parentheses with *** p<0.01, ** p<0.05, and * p<0.1.

As shown in table 8, the main determinant factor of redistribution decisions for participants that chose Spanish to register in the experiment was the "unlockdown" process stage and gender. Similar to the trend found at aggregate level, participants that conducted the experiment in Spanish became significantly less selfish as moved on the "unlockdown" process stages, and women were significantly less selfish than men. These results support hypothesis 3 for the particular case of participants that conducted the experiment in Spanish.

Participants also significantly increased their overall discrimination throughout the "unlockdown" process, as shows the negative and statistically significant coefficient of the *Stage* variable in column 2. However, they do it so towards other participants registered in English and participants that is not known which language used to register in the experiment but do not do it so toward participants that registered in Catalan. This

results partially supports Hypothesis 1, and suggest that superordinate goals might be effective on reducing discrimination between members of different social groups but not if social groups are currently in conflict.

Therefore, I conclude that gradually achieving a superordinate common goal increases discrimination of some participants, in this case participants that chose Spanish language to conduct the experiment, pointing out superordinate common goals without contact between individuals can mitigate overall discrimination patterns.

Next, the same analysis is done for participants that chose Catalan language to register in the experiment. Table 9 shows an OLS regression analysis of participants that chose the Catalan language when registered for the experiment. The dependent variable in column 1 is *Redistribution*, in column 2 it is the overall *Discrimination*. *Discrimination* toward participants that chose the Spanish language to register in the experiment is the dependent variable in column 3 and 4 separately for participants that registered in Catalan and declared to be in favor of the Catalonia's independence and those who not. *Discrimination* toward participants that chose the English language to register in the experiment is the dependent variable in column 5, and *Discrimination* toward participants whose registration language is not known is the dependent variable in column 6. Again, independent variables include *Stage* and *Last movers* variables, and all control variables obtained in the preliminary questionnaire. Standard errors are clustered at participant level.

Table 9 shows that participants that chose Catalan language to conduct the experiment also became gradually more selfish throughout the "unlockdown" process stages, as shows the negative and statistically significant coefficient of the *Stage* variable in column 1. Hence, Hypothesis 3 also accomplish for participants registered in Catalan. Interestingly, the coefficient of *last mover* variable is negative and statistically significant in column 1, which means that the fact of living in a region at the backward of the "unlockdown" process, induced participants to redistribute initial endowment more selfishly.

Table 9: Regression analysis of Catalan participants

Variables	(1) Redistribution	(2) Discrimination (overall)	(3) Discrimination Independentists (Spanish)	(4) Discrimination No Independentists (Spanish)	(5) Discrimination (English)	(6) Discrimination (Unknown)
Stage	-6.03***	-0.07	0.37	1.15	-0.16	-0.60
	(1.25)	(1.31)	(0.68)	(0.73)	(0.53)	(0.54)
Last movers	-9.96*	-0.08	0.20	1.21	0.18	-0.93
	(5.49)	(4.26)	(1.98)	(3.04)	(1.82)	(1.54)
Universal basic rent	45.90***	-21.04*	-17.04**	-3.69	-6.28	-3.93
	(17.01)	(10.79)	(7.60)	(5.55)	(4.20)	(3.44)
Independence of Catalonia	-10.06	18.99**	-	-	4.39	4.99*
	(15.03)	(8.03)			(3.22)	(2.75)
Self determination	4.20	14.37	-	2.50	1.74	7.58
	(27.92)	(16.50)		(7.03)	(7.32)	(4.63)
Age	0.87	-0.70	-0.10	-1.02**	-0.21	-0.26
	(1.07)	(0.52)	(0.30)	(0.45)	(0.20)	(0.19)
Student	4.58	0.38	1.63	-1.18	-0.98	-0.50
	(18.36)	(9.58)	(5.65)	(4.68)	(4.12)	(3.15)
Dependent	-27.78	6.13	8.90	6.80	1.97	-2.73
	(36.41)	(13.94)	(12.25)	(6.69)	(5.04)	(4.92)
Kids	23.41	25.89	6.99	8.69	1.69	14.85*
	(27.18)	(20.68)	(13.41)	(11.06)	(5.44)	(8.46)
Gender	7.03	-12.77	-7.58	1.89	-4.15	-4.41
	(14.33)	(8.17)	(4.66)	(5.21)	(3.27)	(2.69)
Constant	-104.09**	51.98**	35.58***	29.19	22.51**	13.69*
	(45.34)	(22.59)	(13.06)	(13.26)	(9.93)	(7.31)
Observations	1,660	1,660	960	700	1,660	1,660

Note: Robust standard errors, clustered at the participant level, are reported in parentheses with *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

Being in favor of implementing a basic rent in their countries is a determinant factor for decreasing both selfishness and discrimination. The attitude towards the independence of Catalonia strongly affects discrimination. Participants in favor of the Catalonia's independence discriminate significantly more overall. However, discrimination of participants registered using the Catalan language towards any receivers is not affected by the "unlockdown" process stages (regardless being in favor or not to the independence of Catalonia). Hence, Hypothesis 1 does not accomplish for participants registered in Catalan.

Next, the same analysis is done for participants that chose English language to register in the experiment. Table 10 shows an OLS regression analysis of participants that chose the English language when registered for the experiment. The dependent variable in column 1 is *Redistribution*, in column 2 it is the overall *Discrimination*, *Discrimination* toward participants that chose different languages to register in the experiment are the dependent variables in column 3 and 4, and *Discrimination* toward participants whose registration language is not known in column 5. Again, independent variables include *Stage* and *Last movers* variables, and all control variables obtained in the preliminary questionnaire. Standard errors are clustered at participant level.

Table 10: Regression analysis of English participants

Variables	(1) Redistribution	(2) Discrimination (overall)	(3) Discrimination (Catalans)	(4) Discrimination (Spanish)	(5) Discrimination (Unknown)
Stage	-4.71**	0.17	0.29	-0.17	0.05
	(2.14)	(4.47)	(1.88)	(1.71)	(1.53)
Last movers	-8.39	9.23	4.70	1.73	2.80
	(10.45)	(19.87)	(7.22)	(6.67)	(7.26)
Universal basic rent	-50.12	-34.02	-3.56	-26.11	-4.34
	(50.99)	(41.42)	(18.15)	(17.66)	(11.59)
Independence of Catalonia	7.00	-2.40	-29.12	23.91	2.79
	(60.93)	(36.34)	(20.49)	(17.12)	(12.68)
Self determination	-19.48	-30.17	-22.34 *	-4.06	-3.76
	(40.16)	(23.01)	(12.98)	(8.44)	(6.95)
Age	-3.20	-7.05*	-3.63**	-2.02	-1.38
	(3.67)	(3.91)	(1.62)	(1.42)	(1.12)
Student	-226.27***	-40.73	-30.27	-8.95	-1.50
	(78.06)	(46.91)	(22.97)	(15.76)	(14.12)
Dependent	-	-	-	-	-
Kids	-113.30	365.01***	223.68***	125.54***	15.78
	(100.46)	(81.62)	(38.40)	(35.38)	(25.54)
Gender	104.90*	-74.00	-19.62	-35.63	-18.75
	(54.50)	(52.54)	(20.75)	(21.13)	(14.11)
Constant	180.94	301.60	150.15	97.30	54.13
	(151.57)	(179.12)	(71.74)	(63.58)	(51.97)
Observations	120	120	120	120	120

Note: Robust standard errors, clustered at the participant level, are reported in parentheses with *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

Table 10 shows that participants that chose English language to conduct the experiment also became gradually more selfish throughout the "unlockdown" process stages, as shows the negative and statistically significant coefficient of the *Stage* variable in column 1. Hence, Hypothesis 3 also accomplish for participants registered in English. Student participants redistributed endowments significantly more selfishly than no student participants.

Regarding discrimination, the *Stage* variable is not statistically significant neither in columns 2, 3, 4, and 5, which means discrimination levels of participants that register in English was not affected by the "unlockdown" process. Participants living with kids significantly discriminate more agains receivers whose registration language was known.

4.5. Discussion

Intergroup conflicts have caused more than 200 million deaths in the 20th century (Rummel, 1997) and have been considered the main problem of the past century by social psychologist (Fiske, 2002). Since the end of the Second World War, the number of armed conflicts around the world has gradually increased and reached its maximum

number in 2019, most of them occurring within country boundaries (intrastate conflicts).[50]

There exists extensive literature studying interventions aimed at reducing discrimination and prejudices between members of different social groups. One of the main factors that have been found to reduce discrimination and stereotypes between individuals effectively is contact and interactions between members of different social groups. The emergence of the covid-19 forced cooperation among individuals, institutions, and governments restricting contact between individuals, which offers an opportunity to investigate the role of superordinate goals in mitigating discrimination when there is not contact or interaction between individuals.

Results show participants who chose to conduct the experiment in Spanish significantly increase their discrimination as the common superordinate goal was gradually achieved, which points out superordinate goals not requiring contact between individuals might be effective in reducing discrimination between members of different social groups. However, they did so toward other participants who chose to conduct the experiment in English and participants that was not known which language chose when register in the experiment, but they did not so toward participants who register in Catalan. On the other hand, participants who conduct the experiment in Catalan and English did not alter their discrimination levels during the experiment. These results suggest the effectiveness of superordinate common goals in reducing discrimination might be limited, specially, between members of different social groups in conflict. One plausible explanation for these results might be behind the command control on managing the consecution of the superordinate common goal. In this case was the Spanish central government who designed and implemented the "unlockdown" process. Although regional politic leaders were able to make suggestions and requests about implementing new measures or relaxing adopted measures, all of them were subedited to the approval of the central government. This different status in the command of control over the measures implemented to achieve the superordinate common goal might have caused only participants that conducted the experiment in Spanish have seen affected their discrimination levels during the experiment.

Two months after the "unlockdown" process implemented by the Spanish government had finished and the "state of alarm" deactivated, the number of new cases

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[50] See https://ucdp.uu.se/downloads/charts/ (active dyads and conflicts by year) and https://ucdp.uu.se/downloads/charts/ (armed conflicts by conflict type and year).

and deaths of covid-19 increased again and regional politic leaders were given the full command control to manage the situation. Although this experiment did not continued until then, it would have been interesting to study how discrimination levels of participants in the experiment would have react to the transfer of the command control to regional politic leaders, especially, taking into account that Catalonia was governed at that moment by pro-independence political parties.

Also note this experiment was conducted in a period in which the soperordinate common goal was gradually achieved and the common threat gradually attenuated. However, it would also be interesting to study the "other side of the coin," that is, how participants would have discriminated against each other during the period in which the number of infections and deaths increased and the common threat was gradually growing.

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156

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Appendix A

Intergroup conflict between Catalans and Spaniards and the idiosyncrasy of Catalan language

Catalonia is a Spanish region located in the northeast of Spain. Although some Catalans identify themselves as Spaniards or as both Catalans and Spaniards to some extent, some Catalans identify themselves only as Catalans. A Catalan national identity sense often accompanies the Catalan group identity sense of Catalans that do not identify themselves as Spaniards. Together with disputes over economic resources, governance, and culture, Catalan national identity sense has historically led to an intergroup conflict between Catalans and Spaniards regarding Catalans' self-determination right and the independence of Catalonia from Spain.[51] The conflict and the support for Catalonias' independence have gradually intensified in the last decade. On the 13th of September 2009, the first referendum about the independence of Catalonia at a municipal level was conducted in a small village called Arenys de Munt. In this first Catalan independence referendum, 2.569 people voted in favor of the independence of Catalonia. During the two next years, more than 500 municipalities

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[51] Catalonia has been uninterruptedly under Spanish governance since Nueva Planta decrees were signed in Catalonia on 16 January 1716.

organized similar referendums that were not sanctioned by the Spanish government. Eight years after the first referendum, in June 2017, the president of Catalonia announced a Catalan independence referendum at a national level (Catalonia). However, the central government of Spain did not approve nor officially recognize the referendum, and tried to prevent it. Four months later, on the 1st of October 2017, approximately 2 million Catalans voted in favor of constituting Catalonia as an independent republic state. The 1st of October was a turning point in the conflict. On the one hand, because despite the efforts made by the central government to prevent the referendum, the 1st of October many Catalans voted depositing their votes physically in a ballot box. On the other hand, because in the last governmental attempt to impede the voting consisting on seizing the ballot boxes the day of the referendum, police officers encountered the resistance of the voters and exercise violence captured and published in many local and international newspapers cover.

In the following months and years, the conflict escalated even more. Before 2017 finished, some members of the Catalan government and Catalan parliament, and some social leaders were accused of rebellion and sedition for promoting the referendum. The president of Catalonia and some "councilors" moved to different European countries to avoid being judged by the Spanish law system. In contrast, the vice president, some "councilors", the president of the Catalan parliament, and the social leaders were put preventively in prison. The 14th October 2019, most of the defendants, including the social leaders, were found guilty of sedition and sentenced to prison terms of between 9 and 13 years.

Globally, language is seen as one of the most prominent components of national identity (Stokes, 2017). The Catalan language is one of the main distinctive and symbolic traits of the Catalan identity and pro-independence movements in Catalonia. Indeed, Clots-Figueras and Masella (2013) found empirical evidence that students exposed for a longer time to the Catalan language in the compulsory education system developed stronger Catalan feelings and preference for Catalanist political parties (i.e. political parties founded in Catalonia). However, Catalans have not always been allowed to speak in Catalan. During the Spanish dictatorship period (1940-1975), all regional languages in Spain were banned, although its speakers did preserve their usage clandestinely. After the dictatorship ended, Spanish regions were conferred the political status of autonomous communities and some political powers to legislate through their own parliaments. Catalonia was pioneer in recovering the use of the Catalan language,

specially, in the education system. In 1983, the Catalan government approved the "Catalan Law of Language Normalisation", which reintroduced the Catalan language into all education levels below university and converted the education system into a bilingual system. Nowadays the usage of the Catalan language is widely extended and required in Catalonia. All high school students in Catalonia must reach an elemental knowledge of Catalan and Spanish languages to obtain their compulsory education degrees or enter university, and an elemental knowledge of the Catalan language is also compulsory to become a civil servant in Catalonia.

Appendix B
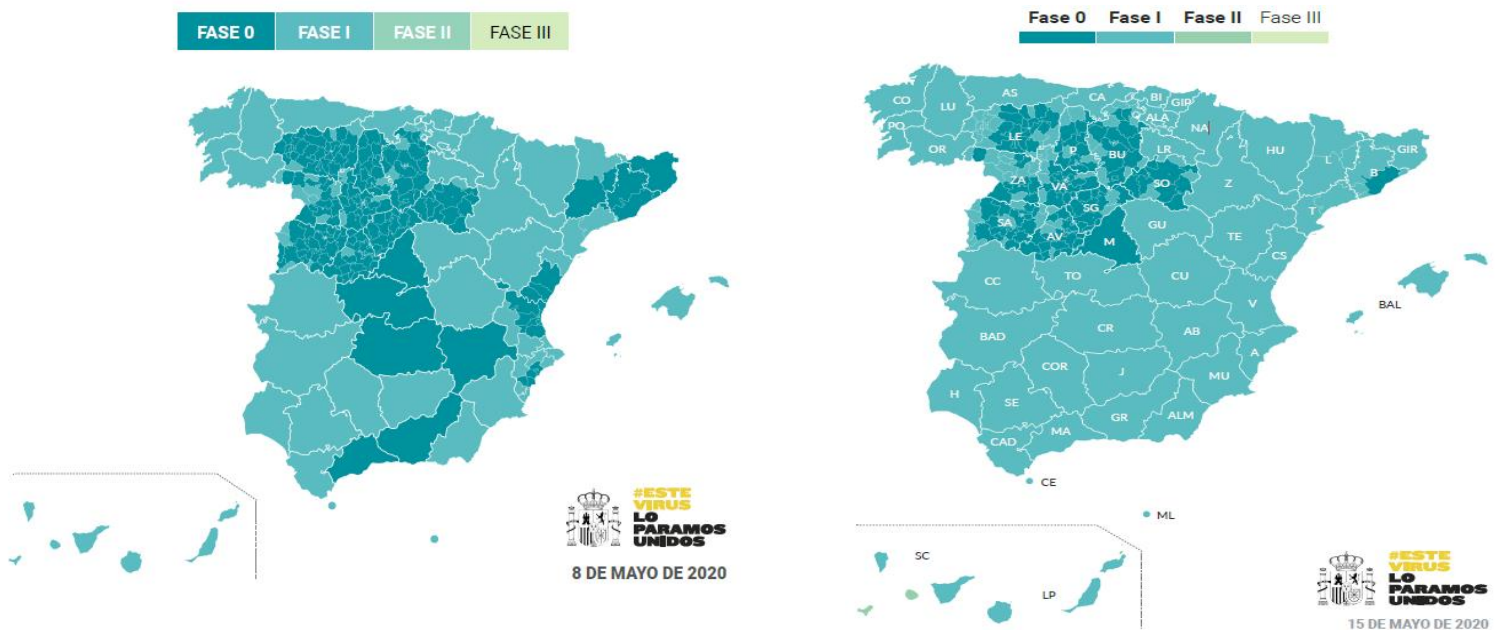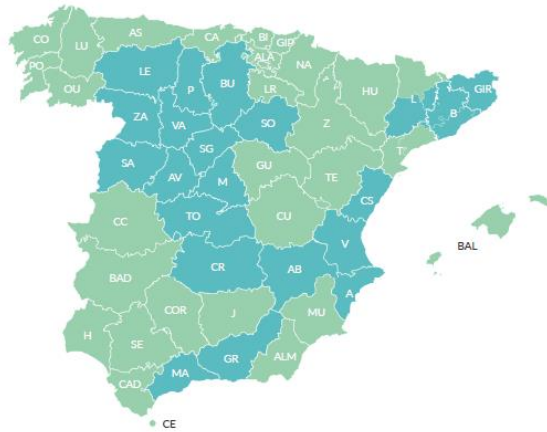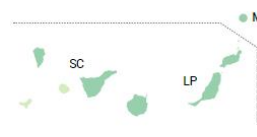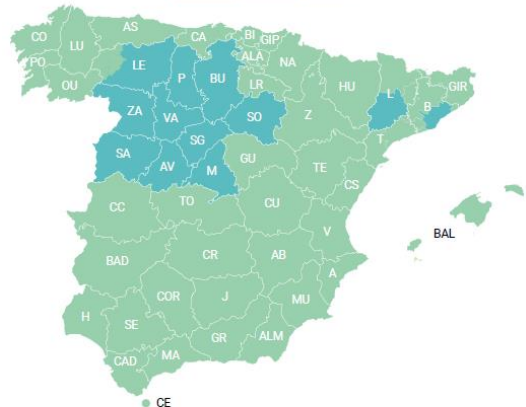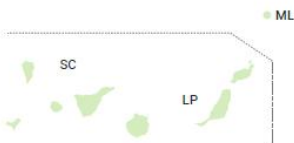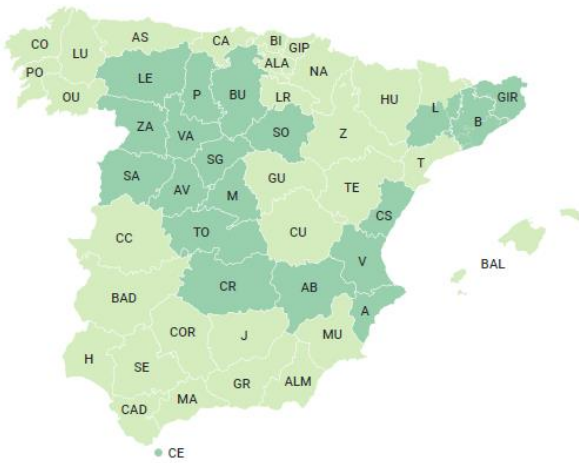
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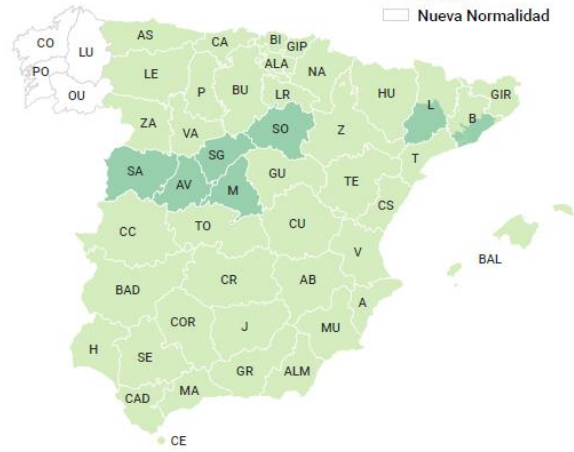
17 DE JUNIO DE 2020
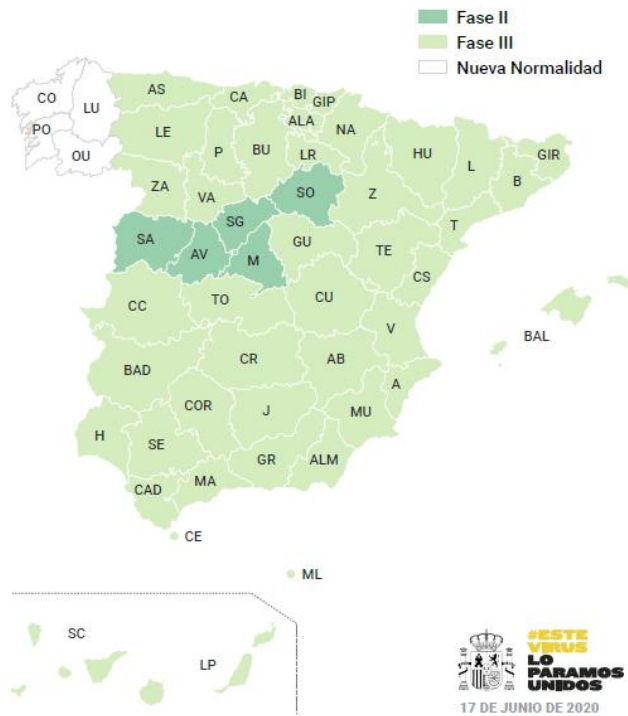
Appendix C

Pictures 1: Electronic recruitment

a) Invitational e-mail

b) Registration twits

Hola!
Aquest mail es una invitació per a participar en un experiment online. L'objectiu d'aquest experiment es el d'estudiar la presa de decisions en diferents contexts estratègics. En aquest experiment hauràs de respondre 5 preguntes al llarg de dos mesos. Cada pregunta es pot respondre en menys de 3 minuts. Pots guanyar fins a un màxim de 300€. Un cop finalitzat l'experiment seleccionarem a l'atzar els 35 participants que rebran una compensació econòmica a través d'una transferència bancària. Aquest experiment va dirigit tant a estudiants com a no estudiants. Et pots registrar a l'experiment a través de qualsevol dels links que hi ha al final d'aquest mail. Si vols pots difondre aquest mail. Al llarg de l'experiment podràs formular preguntes en qualsevol moment a través dels comptes de correu electrònic decisionlab@esade.edu o adria.bronchal@esade.edu.
Moltes gràcies!

¡Hola!
Este mail es una invitación para participar en un experimento online. El objetivo de este experimento es el de estudiar la toma de decisiones en diferentes contextos estratégicos. En este experimento deberás responder 5 preguntas a lo largo de dos meses. Cada pregunta se puede responder en menos de 3 minutos. Puedes ganar hasta un máximo de 300 €. Una vez finalizado el experimento seleccionaremos al azar los 35 participantes que recibirán una compensación económica a través de una transferencia bancaria. Este experimento va dirigido tanto a estudiantes como a no estudiantes. Te puedes registrar en el experimento a través de cualquiera de los links que hay al final de este mail. Si quieres puedes difundir este mail. A lo largo del experimento podrás formular preguntas en cualquier momento a través de las cuentas de correo electrónico decisionlab@esade.edu o adria.bronchal@esade.edu.
¡Muchas gracias!

Hello!
This email is an invitation to participate in an online experiment. The aim of this experiment is to study decision-making in different strategic contexts. In this experiment you will have to answer 5 questions throughout two months. Answer each question will not take you more than 3 minutes. You can earn up to a maximum of € 300. Once the experiment is over, we will randomly select the 35 participants who will receive a payment through a bank transfer. This experiment is aimed at both students and non-students. You can sign up to the experiment via any of the links at the end of this email. Feel free to spread this email. Throughout the experiment you can ask questions at any time through the email accounts decisionlab@esade.edu adria.bronchal@esade.edu.
Thank you so much!

Registra't aquí:
https://esade.eu.qualtrics.com/jfe/form/SV_eEzDRZysgzBTaqV

Regístrate aquí:
https://esade.eu.qualtrics.com/jfe/form/SV_3Cwaryw5FMArUsl

Sign up here:
https://esade.eu.qualtrics.com/jfe/form/SV_4U6N1lZsykCiTdj

162

Appendix D

Thank you very much for your participation in this experiment!

To sign up on the experiment, you must answer several questions that you will only answer during this registration process, and accept the terms and conditions in the participation consent form that you will find below. **You can sign up for the experiment only 1 time.**

Thank you.

Initial questionnaire

Contact mail:

Create your anonymous, unique and personal experimental code. Write the first three letters of your name and the last three numbers of your ID.

Gender
◯ Male
◯ Female

Age

What city or town were you born in?

In which city or town are you currently residing?

Do you live with a dependent person who you take care of?
◯ Yes
◯ No

Do you live with any of your children?
◯ Yes
◯ No

If so, how many and how old are them?

Are you a student?

○ Yes

○ No

If so, in which university or institution?

On a scale from 0 to 10, being 0 null and 10 perfect, what is your knowledge degree of the following languages?

Spanish

0   10

Catalan

0   10

English

0   10

Would you be in favor of implementing a universal basic income in your country?

○ Yes

○ No

○ I do not care

Do you think that Catalans should have the right to vote in a referendum whether they want to become an independent state?

○ Yes

○ No

○ I do not care

Would you like Catalonia to be, as a republic, an independent state?
○ Yes
○ No
○ I do not care

In order to participate in the experiment, it is very important that you read and understand the experimental instructions presented below. In addition, we will ask you to answer for first time the question that you will be asked to answer throughout the experiment.

Experiment

Instructions

In this experiment, each participant will potentially have € 100. **Your task will consist on deciding how to redistribute the € 100 of four other participants.** To do this, you can transfer any amount of your € 100 to any other of these four participants at a ratio of 1 to 0.5. This means that for every € 1 you decide to transfer to any of the other four participants, that participant will receive € 0.5. You can also take any amount of the € 100 from any of the other four participants at a ratio of 1 to 0.5. This means that for every € 1 you take from them you will receive € 0.5.

The other four participants over which you will decide will be randomly chosen and they will be: one that has registered in the experiment through the **link in Catalan**, another through the **link in Spanish**, another through the **link in English** and a fourth that **you will not know which link has used to register in the experiment**. **None of these four participants will be informed about which link you have used to register.**

We will ask you (via email) to make this redistribution decision five times, once every two weeks approximately, throughout the months of May, June, and July.

Payment

To be an eligible participant to receive a bank transfer, you will have to make your redistribution decision five times within a maximum period of three days from the moment you receive each of the emails.

At the end of the experiment, **we will randomly select 35 participants**. From these 35 participants, we will **randomly select one of the five redistribution decisions made by 7 of them.** These decisions will determine all the payments of randomly selected participants. This way, if you are one of the participants whose decision matters for payments, your selected redistribution decision will determine your payment and that of other 4 participants (**one who has registered in the experiment through the link in Catalan, another through the link in Spanish, another through the link in English, and a fourth that you do not know which link has used to register in the experiment**). Conversely, if you are randomly selected to be paid but your decisions are not the ones that matter, you will receive the payment decided by one of the other participants randomly selected whose decisions matter. **Therefore, you must behave in each of your decisions as if you were going to be selected and your decisions mattered to determine payments,** also taking into account that if you are not selected to be paid or your decisions do not matter for payments, your decisions will not influence either other participants' payments or decisions since they will not know your decisions.

Examples

Example 1: If you decide not to transfer any euro neither to the participant registered in Catalan nor to the one that you do not know what language has registered in, to transfer € 50 to the participant registered in English, and to take € 20 from the participant registered in Spanish, then:
Your final total euros would be: 100 - 50 + (20 * 0.5) = **€ 60**
The total final euros of the participant registered in Catalan would be: 100 = **€ 100**
The total final euros of the participant registered in Spanish would be: 100 - 20 = **€ 80**
The total final euros of the participant registered in English would be: 100 + (50 * 0.5) = **€ 125**
The total final euros of the participant that you do not know what language has registered in would be: 100 = **€ 100**

Example 2: If you decided to transfer € 20 to the participant registered in Catalan and € 40 to the one registered in Spanish, and take € 10 from the participant registered in

166

English and € 15 from the one that you do not know what language has registered in, then:

Your final total euros would be: 100 - 20 - 40 + (10 * 0.5) + (15 * 0.5) = **€ 52.5**

The total final euros of the participant registered in Catalan would be: 100 + (20 * 0.5) = **€ 110**

The total final euros of the participant registered in Spanish would be: 100 + (40 * 0.5) = **€ 120**

The total final euros of the participant registered in English would be: 100 - 10 = **€ 90**

The total final euros of the participant that you do not know what language has registered in would be: 100 - 15 = **€ 85**

Decisions

Now is time to make your first redistribution decision in this experiment.

Recall that none of the other four participants whose € 100 you are going to redistribute will never know which link you have used to register in the experiment.

Decide how many of your € 100 do you want to transfer to each of the following participants (maximum you can transfer € 100 in total among the four participants) and how many you want to take from each of them (maximum € 100 from each of them):
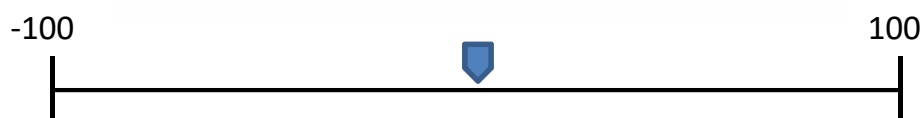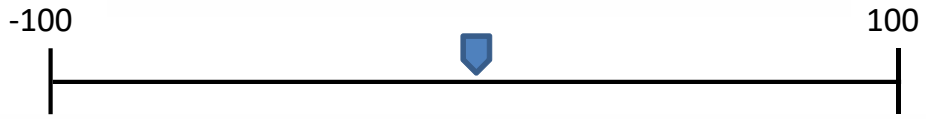
A participant registered in Catalan
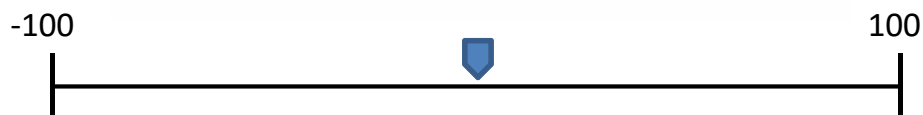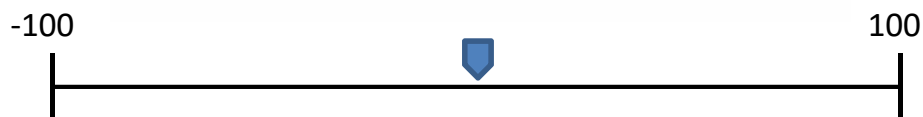
-100   100

A participant registered in Spanish

-100   100

A participant registered in English

-100   100

A participant that you do not know what language has registered in

-100   100

We thank you for your time spent taking this survey.
Your response has been recorded.

5

Conclusions

5.1. Concluding remarks

This thesis has aimed to extend and advance on the study of group identity effects on individual decision-making and mitigating factors of discriminatory behaviors based on group identity. The findings offer several implications for policymakers and managers of firms and organizations dealing and managing group identity diversity to avoid social conflicts or inefficiencies derived from a lack of cooperation and coordination among individuals.

Regarding the effects of group identity on individual decision-making, this thesis has explored the role group identity uncertainty has in individual interaction preferences and the repercussions of reinforcing group identity on collective coordination in Chapter 3. When exploring the effects of group identity uncertainty, it has been found that in the short term group identity uncertainty does not deter interaction among individuals as much as group identity diversity. However, in the long term group identity uncertainty deters interaction among individuals more than group identity diversity. These results provide new insights that could be applied when forming workgroup and deciding to what extent its members know each other. According to these results, to maximize interactions among members of a workgroup diverse in terms of group identity its members should not know each other in the short term, whereas they should know each other in the long term. On the other hand, Chapter 3 also shows that reinforcing group identity through a cooperative group-solving task contributes to collective coordination efficiency, which highlights the importance of building up group identity through cooperation among group identity members for collective coordination.

Regarding the mitigating factors of discriminatory behaviors, this thesis has investigated the effectiveness of three different factors on reducing discrimination between individuals. First, it has been shown in Chapter 2 of this thesis that pointing to behavior similarities unifies individuals more than behavior differences disunite them. This result indicates that it is possible to make people identify with each other by letting them know they behave in the same way in a particular context, which offers an alternative mechanism through which mitigating discriminatory behaviors and the emergence of intergroup conflicts. In line with a result found by Charness et al. (2014), Chapter 3 of this thesis also shows that economic incentives can act as a deterring factor of discrimination patterns on interaction decisions of individuals. Concretely, it has been found that individuals do not discriminate by group identity when deciding with

whom to interact if interactions entail high economic incentives. This result points out economic motivations can overcome group identity concerns and provides an additional tool to decrease segregation in many social contexts and foster interactions among employees in the workplace. Finally, this thesis has tested in Chapter 4 whether individuals from different social groups, some of them involved in an ongoing conflict, reduce discrimination against each other when they are forced to cooperate to achieve a superordinate common goal without being able to get in contact. The results found show that some individuals discriminated more when redistributing economic resources as the superordinate common goal was gradually achieved. However, discrimination degrees between members of the social groups in conflict remain unaltered as the superordinate common goal was gradually achieved. These results suggest the effectiveness of superordinate common goals in reducing discrimination between individuals that do not get in contact might be limited, specially, between members of different social groups in conflict.

5.2. Limitations and future research

This thesis has presented three experiments addressing novel research questions in the literature of group identity effects on individual decision-making and discrimination between individuals. Like any other research approach, economic experiments also have some limitations. Since all experimental participants in the experiments presented in this thesis had voluntarily enroll in the experiments it is possible the data obtained suffer from a self-selection bias (Harrison et al., 2009).

Furthermore, as experimenter, I did not have control over the demographics traits of experimental participants, which entails a risk of obtaining an unbalanced sample, for example, in terms of the group identity of participants. This is the main limitation of the lab-in-the-field experiment presented in Chapter 2. Not having enough participants of a particular group identity in this experiment has limited some of the analysis that might be interesting to address in future research projects. For instance, it has not been possible to extend the analysis of how similarities and differences on behaviors among social group members in social and individual context differently affect the group identity of members of different social group. Besides, and due to not having a sample pool of participants big enough, it has not been possible to investigate how group

identity of participants fluctuates when they can choose from which social group to receive information.

In the experiment addressing the effects of group identity uncertainty on individual interaction preferences presented in Chapter 3 experimental participants were not allowed to decide whether to reveal their group identity or not.[52] Despite there are many contexts in which individuals are not allowed to reveal or signal their group identities, there are other contexts in which the decision to reveal one's group identity might have a strategic component. Further research should be conducted to examine more comprehensively the effects of group identity uncertainty on interaction preferences and determine if individuals are differently discriminated when they have the opportunity to reveal their group identity but do not do so as compared to when they do not have the opportunity to reveal their group identity.

Finally, it would be very interesting to complement and extend along two dimensions the experiment presented in Chapter 4. First, in regards the status different social groups have in achieving the superordinate goal. In the experiment presented the "leaders" of one social group had the command control on deciding measures to achieve the superordinate common goal. This different status in the command of control over the measures implemented to achieve the superordinate common goal might be the reasons why members of the other social group did not alter their discrimination degree as the superordinate common goal was gradually achieved. Equal status on interaction between social groups in conflicts has been proposed to be a crucial factor to reduce discrimination (Allport, 1954). Thus, it would be interesting to investigate whether equal status in the command of control to achieve superordinate common goals could also have a significant effect on mitigating discrimination. Second, the experiment was conducted in a period of time in which the superordinate common goal was gradually achieved and the common threat simultaneously decreased. In other word, this study shows the evolution of discrimination patterns between members of different social groups throughout a period in which the situation gradually improved. It would be very interesting to complement this study with future research analyzing how discrimination patters evolve as the situation gradually worsens.

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[52] To the best of my knowledge the few experiments studying how group identity uncertainty affects individual decision-making have also imposed group identity uncertainty (Yamagishi and Mifune, 2008; Güth et al., 2009; Ockenfels and Werner, 2014; Guala et al., 2013).

5.3. References

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