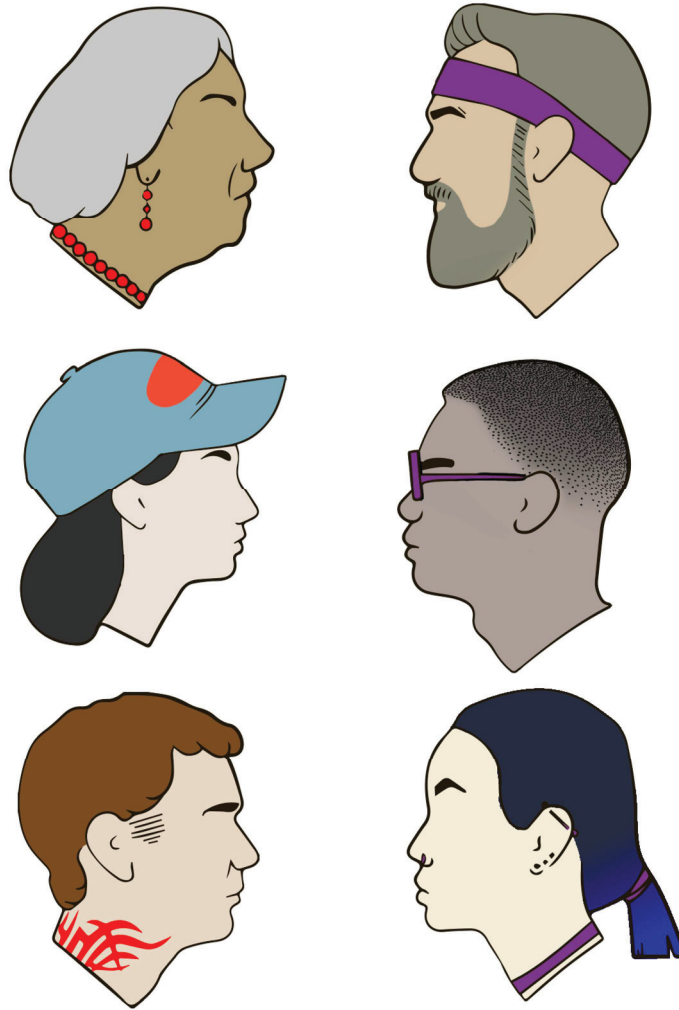# Beyond Us versus Them

Explaining Intergroup Bias in Multiple Categorization

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PhD Thesis

Beyond Us versus Them

Explaining Intergroup Bias in Multiple Categorization

Dissertation

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"All good people agree,

And all good people say,

All nice people, like Us, are We

And every one else is They:

But if you cross over the sea,

Instead of over the way,

You may end by (think of it!) looking on We

As only a sort of They!"

Rudyard Kipling, 1926

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Bremen, January 2019

EXECUTIVE SUMMARY

The psychological and sociological explorations of intergroup relations have traditionally focused on understanding prejudice and discrimination along a single dimension of social categorization: We study racism and sexism, anti-immigrant attitudes and homophobia, ageism and Islamophobia. What these studies fail to consider is that in real life, each of us belongs to multiple groups. Sociology experiences a boom of research on intersectionality, whereas psychological accounts of consequences of belonging to multiple social groups are still underdeveloped. This dissertation aims to address this gap by investigating attitude formation in situations in which multiple group memberships of a target person are salient, i.e. in multiple categorization settings. Building on social cognition and intergroup relations literatures, I develop a theoretical framework that (1) differentiates between two routes through which group memberships can affect attitudes: ingroup bias and preference for higher status; (2) places perception of similarity as the main cognitive mechanism linking the information about group memberships of others to attitudes towards them; (3) incorporates individual- and societal-level moderators of the effects of group memberships on attitudes. In a series of studies, I demonstrate the difference between the two types of social categories that operate via the two distinct routes. The groups that provide a sense of community and shared norms, such as ethnicity and religion, operate via the preference for ingroup members. The groups that provide information about status of the person, such as education or occupation, affect attitudes directly via preference for higher status, irrespective of own group membership. I show that perceived similarity mediates the link between group memberships and attitudes for both types of groups. Finally, I demonstrate that both individual and contextual factors moderate the relationships between group memberships and attitudes. On the individual level, importance of group memberships to the perceiver's self-concept and perceived threat from the outgroup are associated with stronger ingroup bias. On the societal level, lower country-level acceptance of cultural diversity is associated with stronger preference for ingroup members on cultural dimensions, and lower income and educational inequality is associated with stronger preference for higher-status others on socioeconomic dimensions. This dissertation brings attention to and opens up new avenues for the study of psychological consequences of the complexity of the social worlds we live in.

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LIST OF ABBREVIATIONS

ACD	Acceptance of cultural diversity
AIC	Akaike information criterion
BIC	Bayesian information criterion
CI	Confidence interval
ESS	European Social Survey
ICC	Intra-class correlation
ISSP	International Social Survey Programme
ITT	Integrated Threat Theory
OBC	Other Backward Class
RGC	Realistic Group Conflict Theory
SCT	Social Categorization Theory
SIT	Social Identity Theory
SM	Supplementary material
SJT	System Justification Theory
WVS	World Values Survey

INTRODUCTION

Social groups matter. However individualized societies may become (Santos, Varnum, & Grossmann, 2017; Twenge, Campbell, & Gentile, 2013), social groups will never be obsolete. Fundamental cognitive and motivational functions of social groups ensure their immutable importance in human life.

Cognitively, social groups are a product of social categorization. Categorization is a cognitive process of classifying objects and events. By placing ourselves and others into groups, we understand who we are in relation to others. This grouping also structures and simplifies the social world around us in a way that we are able to accumulate knowledge about it. This process is fundamental to human functioning. Cohen & Lefebvre (2005) argue that the mental operation of categorization "is the basis for the construction of our knowledge of the world" (p. 1). Bruner (1957) says: "all perception is generic in the sense that whatever is perceived is placed in and achieves its 'meaning' from a class of percepts with which it is grouped" (p. 124). And Harnad (2005) simply states "to cognize is to categorize: cognition is categorization" (p. 19).

Motivationally, social groups satisfy number of basic needs. To begin with, human species are not suited for survival as individuals; social cooperation is necessary for human survival (Brewer & Caporael, 2006). Besides such fundamental needs as survival and the need to belong, social groups also satisfy various identity-related needs. The groups we belong to give us history (continuity motive) and draw boundaries to create space for meaningful identities (distinctiveness motive); these groups become part of our self-concept and provide basis for our self-esteem (efficacy and self-esteem motives); and finally, they give us reference points for meaning-making and finding purpose (Vignoles, Regalia, Manzi, Golledge, & Scabini, 2006).

The same functions of social groups that make them essential to human life are also responsible for the emergence of prejudice. We will come back to this point shortly, but before we proceed, some definitional clarifications are due. Prejudice, in most general terms, is defined as "a judgment or opinion formed beforehand or without due examination" (Chambers English dictionary). Although psychologists suggested numerous definitions to narrow down this broad concept[1], the term is still contested and rarely used in psychological literature. In this dissertation, we will use a closely related, but more narrowly defined concept of intergroup bias. Hewstone, Rubin, & Willis (2002) define intergroup bias as a "systematic tendency to evaluate one's own membership group (the in-group) or its members more favorably than a nonmembership group (the out-group) or its members" (p. 576). To incorporate numerous accounts of outgroup members being evaluated more favorably than ingroup members (Jost, Banaji, & Nosek, 2004), we will use a more inclusive definition of intergroup bias. As a working definition for this dissertation, **intergroup bias** is regarded as *the difference in evaluations of ingroup and outgroup members*. We will use the term ingroup bias (Mullen, Brown, & Smith, 1992), when referring to tendency to evaluate ingroup members more favorably than outgroup members.

Let us now come back to the statement that the existence of social groups and existence of intergroup bias are intertwined. Same processes that ensure existence of groups, categorization and identification, also contribute to emergence of bias. Social categories emerge from the assessment of social objects as similar or different. The main function of a category is to efficiently capture intragroup similarities and intergroup differences (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). People have a general tendency to favor similar

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[1] For example, Jones (1997, cit. in Brown, 2010) defines prejudice as "a positive or negative attitude, judgment or feeling about a person that is generalized from attitudes or beliefs held about the group to which the person belongs" (p. 10) and Brown (2010) defines it as "any attitude, emotion or behaviour towards members of a group, which directly or indirectly implies some negativity or antipathy towards that group" (p. 7).

others over dissimilar others (Byrne, 1971; Montoya, Horton, & Kirchner, 2008; Muttarak, 2014; Schachner, Brenick, Noack, Van de Vijver, & Heizmann, 2015). Combine this general tendency with identity-related motives, e.g., to see own membership groups in a positive way, and we can see how existence of social groups and ingroup bias go hand in hand.

To put it short, no matter how strongly the proponents of "colorblindness" and "pure meritocracy" policies may criticize "identity politics", social categorization, identification, and intergroup bias are here to stay. Hence, the study of social identity and intergroup relations will always be timely and of great significance.

Problem statement and the scope of the project

Studies of intergroup relations traditionally focused on a single dimension of social categorization. Large bodies of literature on racism, sexism, anti-immigrant attitudes, homophobia, and other forms of prejudice and discrimination contributed greatly to our understanding of the psychology of intergroup relations. However, with increasing mobility and "diversification of diversity" (Hollinger, 1995) of societies across the globe, the need to investigate processes behind attitude formation and intergroup relations when more than one group membership is salient becomes more pressing and apparent.

Social scientists across the disciplinary boundaries have introduced concepts and theories to map this uncharted territory. In psychology, the *crossed categorization* paradigm (Deschamps & Doise, 1978) was introduced to investigate attitude formation in situations when the perceiver is to evaluate a target described through two membership groups, representing two intersecting dimensions of social categorization. Later studies use the term *multiple categorization* (Crisp & Hewstone, 2007) to refer to any instances when the target of perception belongs to more than one social group. The concept of *social identity complexity* (Roccas & Brewer, 2002) can be seen as complementary to crossed and multiple categorization, as it is concerned with interrelationships between multiple group identities

within an individual. In sociology, the concept of *intersectionality* was originally proposed to describe Black women's experiences of discrimination (Crenshaw, 1989), but is now widely used to study various forms of intersecting dimensions of disadvantage and power structures (Collins, 2015). Finally, a recently coined term *super-diversity* (Vertovec, 2007) emphasizes the same issue. Super-diversity was introduced within the sociology of migration and was defined as "a dynamic interplay of variables among an increased number of new, small and scattered, multiple-origin, transnationally connected, socio-economically differentiated and legally stratified immigrants" (p. 1024).
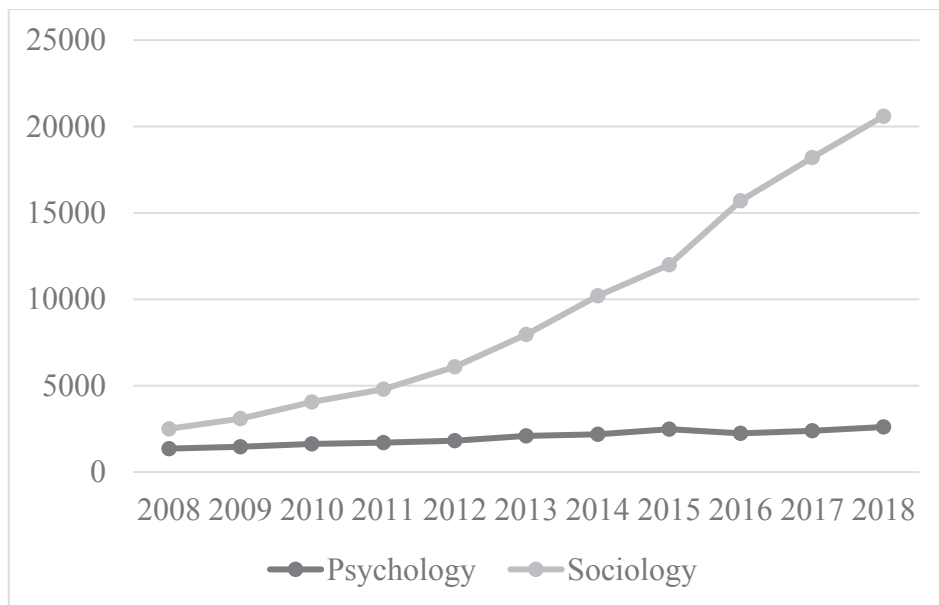
Note. Search words for Sociology: "intersectionality" OR "superdiversity" OR "super-diversity".
Search words for Psychology: "multiple categoriz(s)ation" OR "crossed categoriz(s)ation" OR "dual identity" OR "social identity complexity" OR "multiple group memberships".

Figure 1.1. Google Scholar hits since 2008 for topics related to multiple group memberships.

Although the theoretical grounds for the study of psychological and societal consequences of belonging to many groups have been developed both in psychology and sociology, this topic received much more attention in sociology. As Fig. 1.1 shows, there has been hardly any increase in psychological research addressing crossed and multiple categorization and the complexity of social identity in the past 10 years.

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Addressing this gap, the current dissertation aims to contribute to our knowledge of complex processes behind attitude formation in multiple categorization settings. Building on studies of crossed and multiple categorization and social-psychological theories of intergroup relations, we address two broad questions. First, do the mechanisms of impression formation identified in studies of crossed categorization with two dimensions hold for cases of multiple cross-cutting dimensions of social categorization? Second, can existing theories of intergroup relations that were developed and tested in simple categorization settings explain intergroup bias that occurs in multiple categorization settings?

In addressing these questions, we strive to overcome some limitations of earlier studies of crossed and multiple categorization with regard to ecological validity. This project implements a research design that takes the experimental study of multiple categorization outside of the laboratory setting. For all studies, we employ factorial survey experiments that allow manipulating many dimensions of social categorization, which was methodologically challenging for earlier studies of crossed categorization (Nicolas, la Fuente, & Fiske, 2017). We take a culture-conscious approach and use real social groups relevant for the given social context, rather than using artificial groups or pre-determined groups selected by the researcher (Ensari & Miller, 2001). We use a comparative cross-cultural design that allows, on one hand, to investigate the role of context, and on the other hand, ensures greater generalizability of the findings. Our samples come from Australia, Armenia, Brazil, India, and Russia, providing valuable data from underrepresented parts of the world. Finally, we recruit diverse samples in each country, including members of minority groups, to overcome the majority bias of social psychological research (Hindriks, Verkuyten, & Coenders, 2014).

Outline of the dissertation

This dissertation is comprised of five chapters that together aim to uncover the processes underlying attitude formation in multiple categorization settings. Table 1.1

provides a summary of each chapter, including main research question addressed in the chapter complemented with a short answer to that question, samples and methods used in the chapter, and a brief summary of findings.

Chapter 1 lays the theoretical grounds for the study of attitude formation in multiple categorization. In this chapter, we analyze processes of social categorization, group formation, and the emergence of intergroup bias. We then provide an overview of main theories of intergroup relations explaining intergroup bias and prejudice. Finally, we summarize findings from crossed and multiple categorization research that lead up to the proposed theoretical model of impression formation in multiple categorization. We draw on these different streams of literature to propose a set of hypotheses addressing the main research questions of the project.

The remaining four chapters report the results of two empirical studies aimed at testing these hypotheses. Study 1 addresses the first question of this dissertation: Do the mechanisms of impression formation identified in studies of crossed categorization with two dimensions hold for cases of multiple cross-cutting dimensions of social categorization? Chapters 2 and 3 present the results of this study.

Chapter 2 investigates the role of perceived similarity as a mechanism of attitude formation in multiple categorization. Our findings show that contrary to propositions that with increasing number of group memberships the category-based information processing will be abandoned (Crisp, Hewstone, & Rubin, 2001; Hall & Crisp, 2005), participants were able to process information about up to eight group memberships of the target. Shared group membership between the participant and the target on each dimension increased perceived similarity with the target, which resulted in more positive attitudes.

Chapter 3 explores whether the evaluative patterns identified in crossed categorization studies with two dimensions of social categorization can be replicated in multiple

categorization settings. We find strong support for the additive pattern of crossed categorization (Brewer, Ho, Lee, & Miller, 1987; Hewstone, Islam, & Judd, 1993), where each additional shared group membership with the target contributes to more positive attitudes towards the target, and no support for any other pattern. This findings are in line with meta-analytical evidence suggesting that additive pattern is the baseline effect of crossed categorization (Migdal, Hewstone, & Mullen, 1998; Urban & Miller, 1998).

Taken together, findings presented in Chapters 2 and 3 provide strong evidence that the basic cognitive processes explaining attitude formation in crossed categorization with two dimensions can also explain attitude formation in multiple categorization with as many as eight group memberships to consider.

Study 2 addresses the second research question of the dissertation: Can existing theories of intergroup relations developed and tested in simple categorization settings explain intergroup bias that occurs in multiple categorization settings? This study is conducted in four countries, providing a comparative perspective. This design allows investigating not only individual, but also societal determinants of intergroup bias in multiple categorization settings. Chapters 4 and 5 report the results of this study.

Chapter 4 develops the individual level of analysis by testing the predictive power of three determinants of intergroup bias proposed in intergroup relations literature, namely strength of identification, salience of intergroup conflict, and perceived symbolic threat. The findings suggest that strength of identification and symbolic threat predict strength of intergroup bias in multiple categorization settings across various dimensions. We provide some initial evidence that intergroup conflict is better suited for explaining bias on the group but not on the individual level of analysis.

Table 1.1. Overview of the dissertation

	Chapter 1	**Chapter 2**
Title	Multiple categorization and intergroup bias: Theoretical background	Perceived similarity in multiple categorization
Research questions	How people form attitudes about others when others' multiple group memberships are salient?	Does perceived similarity mediate the link between others' group memberships and attitudes towards them in multiple categorization settings?
Short answer	Through perceived similarity based on shared group membership with others and others' status, while paying more attention to those membership groups that are particularly important to them and/or particularly threatening to them.	People are able to process information about others' multiple group memberships; each shared group membership increases perceived similarity and results in more positive attitudes towards the target.
Summary of findings	N/A	- Ingroup membership on each categorization dimension increases perceived similarity with the target. - High-status others are evaluated as more similar even if they do not share a group membership with the participant. - All judgments of targets fall into two clusters, which can be described as "in-group-like" and "out-group-like" others. - Participants' attitudes towards the target person are mediated by perceived similarity for all categories.
Countries	N/A	Russia
Sample	N/A	5036 observations nested in 524 individuals
Method	Literature review	Path analysis, cluster analysis

Chapter 3	Chapter 4	Chapter 5
Patterns of evaluation in multiple categorization	Explaining strength of bias on the individual level	Explaining strength of bias on the societal level
Do patterns of evaluation identified in crossed-categorization studies with two group memberships apply to multiple categorization settings?	Can existing theories of intergroup relations predict strength of intergroup bias in multiple categorization settings?	How do characteristics of the environment make specific group memberships more or less important for impression formation?
The results provide strong support for the additive pattern of crossed categorization, challenging the view that with increased number of categories category-based information processing will be abandoned.	Yes. Social Identity Theory and symbolic threat predict strength of bias across many dimensions.	Inclusive normative environment can reduce intergroup bias. People show stronger preference for higher-status others in countries with lower inequality.
1) The number of shared group memberships between the participant and the target is a strong positive predictor of attitudes towards the target. 2) Evidence provides no support for any of the other patterns of crossed categorization.	1) SIT has the greatest generalizability in predicting the strength of intergroup bias across dimensions of social categorization: the more important the group membership is, the stronger is the preference for ingroup members. 2) Perceived symbolic threat predicts stronger bias, but only when the target is a minority or a lower-status group. 3) Perceived conflict predicts stronger bias only on those dimensions where the conflict is salient at the group level.	1) Intergroup bias as a mechanism of impression formation is limited to groups that have well-defined group boundaries and a clear set of normative prescriptions (e.g., ethnicity, religion). 2) Country-level acceptance of diversity is related to lower intergroup bias on the dimension of ethnicity, but not religion. 3) People prefer higher-status others on dimensions of education and occupation irrespective of their own group membership. 4) The preference for higher-status others is stronger in more equal countries.
Russia	Armenia, Australia, Brazil, India	
5036 observations nested in 524 individuals	12810 observations nested in 1281 participants from 4 countries	
Multilevel regression analysis		

Chapter 5 develops the country level of analysis. Using contrast cases approach, we compare four countries with extreme scores on acceptance of cultural diversity and inequality. We test two hypotheses addressing the role of social context in impression formation in multiple categorization. First, we propose that participants in countries with high level of acceptance of diversity will be less biased towards culturally different others. The findings suggest that this is the case for ethnicity, but not religion. Second, we propose that participants in countries with lower level of inequality will show stronger preference for higher-status others. The evidence fully supports this proposition.

Combined, these studies provide a comprehensive account of processes behind attitude formation in multiple categorization settings. We show the limits of generalizability of existing approaches to intergroup bias, provide new insights into different mechanisms linking information about others' group memberships to attitudes and into the role of context in this process, and suggest avenues for future research on attitude formation and intergroup bias.

Significance

In his seminal book *The Nature of Prejudice,* Gordon W. Allport precisely observed: "Civilized men have gained notable mastery over energy, matter, and inanimate nature generally, and are rapidly learning to control physical suffering and premature death. But, by contrast, we appear to be living in the Stone Age so far as our handling of human relationships is concerned. […] Rivalries and hatreds are nothing new. What is new is the fact that technology brought these groups too close together for comfort. […] We have not yet learned how to adjust to our new mental and moral proximity." (Allport, 1954/1979, p. xv)

This statement holds true to this day. Although blatant racism and ethnic prejudice significantly declined (Dobbin, 2009; Firebaugh & Davis, 1988), implicit bias and discrimination persist (Cancio, Evans, & Maume, 2016; Devine & Elliot, 1995; Dovidio & Gaertner, 2010; Quillian, Pager, Hexel, & Midtbøen, 2017; Richeson, 2018). Despite

predictions that modernization will weaken the role of religion and, consequently, reduce religious conflicts (Cox, 2013), these conflicts do not only continue, but are on the rise (Fox, 2004; Juergensmeyer, 2003) and have greater intensity than any other kind of conflict or war (Pearce, 2005). In spite of social class being repeatedly declared dead (Clark & Lipset, 1991; Pakulski & Waters, 1996), inequality is on the rise (Piketty, 2014, 2015) and the poor, the working class, and the lower-educated are still disliked, discriminated, and blamed for their lower socio-economic status (Cozzarelli, Wilkinson, & Tagler, 2001; Kuppens, Spears, Manstead, Spruyt, & Easterbrook, 2018; Volpato, Andrighetto, & Baldissarri, 2017). Finally, the XXI century brought greater attention to forms of prejudice that have been less studied before, namely homophobia, ageism, and anti-immigrant attitudes.

As Figure 1.2 indicates, racism and ethnic prejudice, not surprisingly, received significantly more attention from social science scholars than any other type of prejudice. Interestingly though, the number of studies on homophobia, ageism, religious and anti-immigrant prejudice almost tripled in the XXI century.

As we mentioned earlier in this introduction, the increasing complexity of modern societies' demographic composition raises new challenges for the research on prejudice. Given large regional differences in what dimensions of social categorization cause strongest disparities and conflicts[2] and the fact that many dimensions of social categorization are strongly intertwined in real life (e.g., ethnicity and religion, ethnic minority status and lower socio-economic status), to be able to efficiently tackle the problem of prejudice and discrimination, it is necessary to study universalities and specificities across dimensions of categorization and contexts in attitude formation when many group memberships are salient.

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[2] For example, the prevalence of studies on racism can be explained by the US scientists publishing more than scientists from other countries and the topic of race being so crucial for the American society.
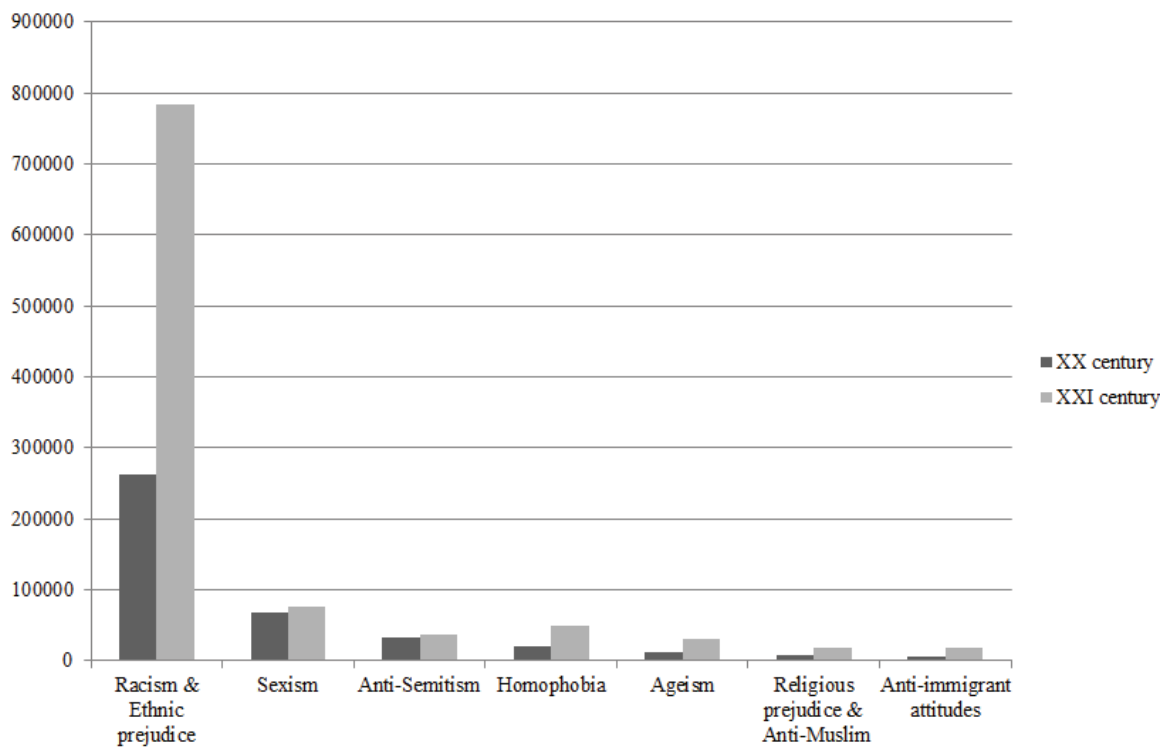
Figure 1.2. Google Scholar hits for different types of prejudice in XX (1900 - 1999) and XXI (2000 – present) century

This dissertation has the potential to make significant contribution to the theory of intergroup relations and its applications by providing a comprehensive account of processes behind attitude formation in multiple categorization settings across contexts. First, the factorial survey design that we implement allows disentangling the dimensions of social categorization that are often interconnected in real world. This approach would allow us to provide evidence on which dimensions of social categorization are the primary drivers of negative attitudes and whether there is universality in the hierarchies of prejudice across contexts.

Second, simultaneously investigating a diverse set of dimensions of social categorization (including those that reflect cultural differences, such as ethnicity and religion, and those that reflect differences in socio-economic status, such as education, occupation, and income) would allow us to contribute to the debate on whether or not all social groups

function similarly and create a preference for ingroup members, as Social Identity Theory (SIT, Tajfel & Turner, 1979) suggests.

Third, conducting studies outside the lab, using real social groups relevant to the given context, sampling diverse groups of participants across various, mostly underrepresented, countries, would contribute to greater external validity and generalizability of intergroup relations literature.

Fourth, combining the individual and the country level of analysis would allow drawing connections across disciplinary boundaries, incorporating sociological and psychological accounts of the role of social context in attitudes. This would hopefully generate new hypotheses and highlight new directions for future research on the role of cultural context in intergroup relations, an area where social psychological research has so much more to contribute.

CHAPTER 1

MULTIPLE CATEGORIZATION AND INTERGROUP BIAS:

THEORETICAL BACKGROUND

Abstract

This chapter provides an overview of basic cognitive processes underlying social categorization and intergroup bias. Building on studies of crossed and multiple categorization, as well as psychological theories of intergroup relations, we propose a set of hypotheses that together describe the process of attitude formation in multiple categorization settings. This proposed theoretical model postulates the following. First, two types of social categories can be distinguished based on the mechanisms through which they affect attitudes: categories related to cultural differences affect attitudes via preference for ingroup members, and categories related to status affect attitudes via preference for higher status. Second, even the number of categorization dimensions to evaluate is high, perceived similarity will still mediate the link between shared group membership on each dimension and the attitude. Third, participants will show stronger intergroup bias on those dimensions that are important to their sense of self and those that are threatening. Fourth, social context will moderate the links between target's group memberships and attitudes towards the target. Individuals in countries with high acceptance of cultural diversity will show weaker intergroup bias on cultural dimensions of social categorization, and individuals in countries with low inequality will show stronger preference for higher-status others.

This chapter draws on literature from social psychology, cognitive science, anthropology, and sociology to develop a theoretical framework for the study of attitude formation in multiple categorization settings. We start by introducing an overview of the processes behind social categorization and group formation, spanning from cognitive underpinnings of categorization process, to evolutionary significance of groups, to psychological studies of social categorization. We then move from categorization to prejudice, providing an overview of psychological approaches to intergroup relations. Linking the research on categorization and intergroup relations to the topic of this dissertation, we further review the studies focusing on attitude formation in crossed and multiple categorization settings. Finally, the last section of this chapter introduces the theoretical framework of the dissertation, which incorporates all these lines of research. In this last section, we develop a theoretical model of attitude formation in multiple categorization, which reflects the set of proposed hypotheses regarding (1) the mechanisms linking information about others' group memberships to attitudes towards them, and (2) individual and group-level moderators impacting attitude formation in multiple categorization settings.

Social categorization and group formation

"All of our categories consist of ways we behave differently toward different kinds of things – things we do or do not eat, mate with, or flee from; or the things that we describe, through our language, as prime numbers, affordances, absolute discriminables, or truths. That is all that cognition is for, and about."

Harnad, 2005, p. 20

Categorization as a cognitive process

Is it edible or not? Is it a person or an animal? Is it a friend or a foe? These are all categorization problems. Categorization is how our mind is able to differentiate things in the

environment, capture similarities between them, and structure the worlds around us in a meaningful way. Without the ability to categorize, we would have no way of interacting with the world. There would be no language, no concepts, no meaning (Love, 2017). Before delving into social categorization, we briefly introduce key characteristics of categorization as a general cognitive process.

To be able to recognize things, i.e. identify something as belonging to a certain class of objects, one has to have the *ability to abstract*. That is, to identify a flower as a flower one needs to see similarities between all flowers while (1) ignoring the uniqueness of each kind of flower and (2) ignoring everything that is not flowers. Or to see a figure on the ground, one needs to ignore the ground. This means that the ability to abstract is the ability to forget things. In "The mind of a mnemonist" (1968/1987) Luria provides an illustration of how important forgetting is to cognitive functioning. He tells a real life story of a memory-artist, who had synesthesia, and partly as a result of it, much more powerful memory than an average person. He was able to remember every little detail of events occurring is his life. Instead of benefiting from this skill, he suffered from a series of difficulties, such as inability to generalize and deal with abstract concepts. Therefore, the ability to forget details and ignore uniqueness, i.e., to abstract, is a necessary precondition to the ability to see commonalities, i.e., to categorize.

The second key characteristic of categorization is that *categories are learned*. Some basic forms of categorical perception, like color perception, are innate. However, even these innate categories are not pre-determined, but rather are the result of evolution: Our ancestors who were able to efficiently differentiate colors out-survived those who weren't (Harnad, 2005). The vast majority of categories we operate with are not innate, but rather acquired through language and socialization. Cognitive science offers various mechanisms that describe how categories are learned. Without going into too much detail, we will note here

that all models of category learning are based on the ability to recognize similarities and abstract. For example, rule-based models (e.g., RULEX, Nosofsky, Palmeri, & McKinley, 1994) describe category learning as a rational hypothesis-testing process, where the successful outcome is a logical rule that can describe all the members of the category and none of the non-members of the category. Other models, such as prototype-based (Posner & Keele, 1968; Rosch, 1973) and exemplar-based models (Medin & Schaffer, 1978), suggest that instead of focusing on a single feature that can differentiate members of category A from members of category B, as rule-based models assume, categories are learned by focusing on all possible properties of category members. The decision whether a new item belongs to a category or not is based on comparing this new item with the prototype or an exemplar. Other, more complex models have been proposed, but all of them are based on the principles of these basic models (Love, 2017).

Finally, *categorization reduces uncertainty*. The two most basic principles of categorization are (1) categories should provide maximum information with minimal cognitive effort, and (2) what is perceived comes as structured information rather than isolated and unpredictable attributes (Rosch, 1978/1999). These basic principles highlight the role of categorization in our ability to make sense of the world, without needing to know everything about every new object, person, or phenomena we encounter. The ability to generalize and ignore uniqueness reduces uncertainty and makes human beings capable of abstract thinking.

From social categorization to group formation

Human mind categorizes everything, and people are no exception. Social categorization structures the social environment the same way categorization in general structures the environment in general. One of the distinguishing characteristics of social categorization is that besides categorizing the outside world (other people), we also

categorize ourselves. The crucial role that social categorization plays in intergroup relations is defined by the fact that it "also provides a system of orientation for self-reference, creating and defining the individual's place in society" (Oakes, 2003, p. 3).

In *The Elementary Forms of Religious Life* (1912/1995)*, Durkheim provides a wonderful example of how awareness of the group and group boundaries is intertwined with the process of categorization. He describes how Australian tribes systematize everything around them, including the people of the tribe, in a way that connects all animate and inanimate beings, and at the same time differentiates them. For example, the Mount Gambier tribe has two phratries (kinship groups), called Kumite and Kroki. Each of these phratries is divided into five totemic clans. Everything that members of the tribe come in contact with is classified into one of the phratries and one of the clans in the phratry. Importantly, there are no overlaps in this classification: if rain belongs to the Crow clan, it cannot belong to any other clan in the tribe. Another important feature of this classification is that things that belong to one or the other phratry are often contrasting things. For example, if Black cockatoo is the totem of one of the clans of the Kumite phratry, the White cockatoo belongs to one of the clans of the Kroki phratry. Similarly, the moon, the stars, and winter are classified under Kumite phratry, whereas the sun and summer belong to the Kroki phratry. No such contrasts are observed within the phratries. Durkheim also notes that similar classifications can be found in other Australian and North American tribes.

This classification serves three functions for group formation: first, it unites the tribe through a shared system of beliefs (the classification is meaningful only if all members of the tribe are aware of it and accept it); second, it differentiates and creates group boundaries for the phratries and the clans by assigning to them a shared group membership with a unique set of other things in the world; third, it structures group differences by representing more intimate relations between the members of the same clan, less intimate relations between the

members of the same phratry, and yet less intimate and potentially competing (the contrasts) relations between the members of two different phratries.

As the example of this classification shows, groups emerge not in opposition to out-groups, but rather through interconnections within the group. This view is consistent with the evolutionary perspective on social identity (Brewer & Caporael, 2006). The evolutionary perspective characterizes human beings as obligatorily interdependent. Most animals form groups of varying levels of interdependence, but humans belong to those species whose survival is dependent on group-living. Hierarchical models of human evolution suggest that evolutionary selection takes place not only at the level of genes, but at various levels of embedded structures: genes are adapted to fit the cellular structure, cells – the individual organism, etc. (Buss, 1987; Jablonka, 1994; Szathmáry & Smith, 1995). Given human survival depends on group-living, groups are the next structural level of adaptation, between individual organisms and their physical environment. This view allows accounting for prosocial behavior that is not self-serving that cannot be explained by the "selfish gene" approach. From the hierarchical models of human evolution and the idea of obligatory interdependence follows that those groups that were more successful in coordinated group-living outsurvived the less successful ones, hence individuals who were better adapted to group living persisted as well. The result of this selection is the development of cognitive and affective processes that enable formation and maintenance of groups (Caporael, Dawes, Orbell, & van de Kragt, 1989). Arguably, the most basic of these processes is social identification.

Experimental evidence from studies with social dilemmas supports the proposition that social identification enables prosociality and cooperation. When the group resources are insufficient, individuals tend to increase their own resource use (self-serving behavior at the expense of group interests) when there is no salient group identity present. However, as soon

as group identification is made salient, the behavior reverses: in a situation of insufficient resources, individuals reduce their own resource use, putting interests of the group above self-interest (Kramer & Brewer, 1984). Group discussions prior to individual decision making have similar effects on cooperative behavior (Orbell, Van de Kragt, & Dawes, 1988). Recent studies of cross-cultural cooperation show that the effect of social identity on cooperation holds even for such abstract group as the world community. Identification with the global community increases cooperative behavior in public goods game with individuals from other countries (Buchan et al., 2009, 2011).

Interdependence and cooperative behavior are the foundations of group existence. This reciprocity is relatively easy to maintain when the groups are small and all members can have direct communication and build trust through everyday interactions. However, membership not only in small, but also in larger groups is necessary for survival, as larger groups provide access to more resources (Brewer & Caporael, 2006). Evolutionary and social psychology offer similar classifications of groups based on their size and functionality. In evolutionary psychology, so-called "core configurations" describe types of interactions between members of groups. Within this approach, four core configurations are specified as a function of group size and task: dyads (prototypical groups size: 2; sex, parent-child interactions), work/family group (prototypical groups size: 5; hunting, gathering), deme (prototypical groups size: 30; movement from place to place, work group coordination), and macrodeme (prototypical group size: 300; exchange of resources and information) (Caporael, 1997).

This theorizing closely resembles another classification obtained using bottom up approach. In a series of studies Lickel, Hamilton, Lewis, & Sherman (2000) investigated how perceptions of group entitativity (perceived connectedness of group members with each other, Campbell, 1958) varied as a function of group properties. Their analysis identified four

distinct types of groups that varied from high to low entitativity: intimacy groups (e.g., family), task groups (e.g., teams), social categories (e.g., ethnic groups), and loose associations (e.g., audience at a movie). Consistent with the idea that cooperation and trust are easier to maintain in groups where direct interactions between group members are possible, authors found that interaction between group members and personal importance of the membership group were the strongest predictors of perceived group entitativity.

The current work is concerned with social categories, as this type of social groups is the source of most harmful and damaging forms of intergroup phenomena: prejudice and discrimination. If social categories are not perceived as highly entitative and are not of high significance to individuals (Lickel et al., 2000), why exactly these group memberships cause so much tension? To answer this question, we should look back to social identity as the glue that holds groups together. Social Identity Theory (SIT, Tajfel & Turner, 1979) and further theorizations based on it (Brewer & Gardner, 1996; Turner et al., 1987) suggest that identification with others can occur at different levels. SIT refers to this differentiation as interpersonal – intergroup continuum (Henri Tajfel, 1974). Brewer and Gardner (1996) differentiate between personal, relational, and collective levels of self. Applying this differentiation to the typology of groups described earlier would suggest that when direct interaction between all group members is possible (intimate groups and task groups), others are incorporated to the sense of self directly through relational representations. Hence, this does not require making any broad generalizations about the groups. When direct interaction is not possible, one has to make such generalizations to be able to incorporate the image of the group to the representation of the self. This is when intergroup phenomena emerge.

From group formation to intergroup bias

Earlier models of human evolution that do not take into consideration the various nested structures in which evolutionary process unfolds arrive at a conclusion that self-

interested individuals join groups for the sole purpose of dominating and exploiting others. Hence, group formation is attributed to intergroup competition rather than ingroup cooperation (Alexander, 1979; Kurzban & Leary, 2001). There is no doubt that humans are self-interested and groups do serve this self-interest by protecting its members from other hostile groups. However, to say that groups exist primarily to compete would be an overstatement. At least, evidence points in a different direction.

First, we are born into groups, rather than consciously choose to join groups. It is only logical that humans would form bonds with others around them before they are even aware of the existence of other groups. Second, there is no evidence that early human societies were dense enough for intergroup competition over resources to occur and, given the cost of fighting, it is highly implausible that groups would choose to fight when there is no such competition (Brewer & Caporael, 2006).

The view of group formation as a product of obligatory interdependence rather than a product of intergroup competition is more consistent with existing evidence. According to this view, intergroup bias occurs simply because interactions within the group are less costly and risky than interactions with outgroups. Shared reciprocity norms ensure a predictable outcome of an exchange with a member of the ingroup, whereas outgroup members are unpredictable and are not expected to reciprocate. Consistent with this theorization, social psychological studies show that the primary driver of intergroup bias is the desire to benefit the ingroup, rather than harm the outgroup (Brewer, 1979, 1999). For ingroup love to turn into outgroup hostility, certain conditions have to be met (Brewer, 1999; Hinkle & Brown, 1990; Kosterman & Feshbach, 1989). For example, studies of national identity and anti-immigrant attitudes repeatedly find that identification with the nation is related to more hostility towards immigrants only if the identification is accompanied with a belief in superiority of one's nation over others (Ariely, 2012; Grigoryan & Ponizovskiy, 2018;

Kosterman & Feshbach, 1989). Another established condition for outgroup hostility to occur is perceived threat. Both realistic (competition for scarce resources) and symbolic threat (perceived incompatibility of groups' norms or values) can lead to outgroup hostility. We now will take a closer look at the determinants of intergroup bias by providing an overview of psychological approaches to prejudice.

Psychological approaches to prejudice

Interest in prejudice as a topic of psychological enquiry spiked after the II World War, when the world learned about the atrocities of the Nazi regime. The systematic study of prejudice in psychology started with personality approaches. The early theories drew on psychodynamic view of human psyche rooted in Freudian psychoanalysis to explain prejudice as a result of frustration, redirected toward more vulnerable members of societies when the true cause of frustration is too powerful or not under individual's control (frustration – aggression hypothesis; Dollard, Miller, Doob, Mowrer, & Sears, 1939). The best known example of this theorizing is the authoritarian personality syndrome (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950), which is a set of personality traits such as cognitive simplicity, rigidity in adherence to norms, and obedience. According to authors, these personality traits develop as a result of early childhood interactions with dominant and strict parents. The unexpressed aggression towards parents is then redirected towards most vulnerable members of society.

Although heavily criticized for methodological shortcomings and for ignoring the role of social context, the ideas put forward in The Authoritarian Personality were highly influential. First, these ideas gave rise to the relative deprivation theory that takes the frustration – aggression hypothesis to the group level (Gurr, 1970). Second, it spurred interest in the study of individual differences in prejudice. Modern theories describe individual differences in prejudice as ideological attitudes rooted in values, personality, social context,

and different worldviews that emerge from these, rather than personality traits (Asbrock, Sibley, & Duckitt, 2010; Cohrs, Moschner, Maes, & Kielmann, 2005; Duckitt & Sibley, 2010). Although individual differences in prejudice obviously exist, prejudiced individuals are not the main cause of intergroup conflicts. As our analysis of categorization processes and evolutionary underpinnings of group formation suggests, differences in ways we treat the groups that we do and do not belong to are inherent in the nature of groups as entities. Therefore, we further focus on group approached to prejudice.

Realistic Group Conflict Theory

Theories explaining intergroup hostility from the group-level phenomena were for a long time the domain of sociology (Bernard, 1957; Coser, 1956/1964; Davie, 1929/2003). Group approaches to prejudice emerged in psychology in mid-50s, as a reaction to the highly individualized view of prejudice that was dominating the field at that time. Drawing on sociological and anthropological literatures, Sherif and his colleagues designed the first experimental test of the hypothesis that negativity towards outgroups emerges from perceptions of threat from this outgroups (Sherif, 1958; Sherif, Harvey, White, Hood, & Sherif, 1961; Sherif, White, & Harvey, 1955; Sherif & Sherif, 1953).

In a series of experiments in a boys summer camp, know as The Robbers Cave experiment, Sherif and colleagues manipulated group competition and traced participants' attitudes towards the outgroup. All the boys attending the camp had similar background, coming from middle-class, non-deprived families. None of them knew each other prior to meeting in the camp. Upon arrival, boys were split into two groups (in two of the three experiments they spent couple of days together before being divided into groups) in a way that the composition of the two groups was as similar as possible. After spending some time within their own group, without much interaction with others, the experimental manipulation was introduced. Organizers offered various activities, all of which were zero-sum games (if

one group wins, the other loses), where the two groups had to compete. As predicted, after introducing this negative interdependence between the groups, intergroup attitudes became negative, supporting the hypothesis that intergroup competition causes prejudice. In the last stage of the experiment, other activities were introduced, where the two groups had to work together to achieve the desired goal. Again, as expected, this positive interdependence led to improvements in intergroup attitudes.

The Realistic Group Conflict Theory (RGCT) was formalized and named by Campbell (1965). In his essay for the Nebraska symposium on motivation, Campbell contrasts RGCT, which acknowledges the rational basis of intergroup conflicts, with psychological theories, "which see intergroup conflicts as displacements or projective expressions of problems that are essentially intragroup or intra-individual in origin" (Campbell, 1965, p. 287). He then enumerates eleven features of RGCT that can be summarized in three key points.

(1) Real conflict of group interests, past or present, causes intergroup conflict. The causal mechanism is that an outgroup that has a conflict of interest with the ingroup constitutes a threat to the ingroup. This real threat causes perception of threat, which in turn leads to hostility towards the source of that threat.

(2) Not only real threat leads to more hostility towards the outgroup, but it also increases awareness of own ingroup identity, tightens the group boundaries, intensifies punishment and rejection of deviants, and consequently, increases ingroup solidarity and ethnocentrism.

(3) Finally, not only accurate, but also false perception of threat from an outgroup leads to increased solidarity with the ingroup and negativity towards the outgroup.

Although there is ample evidence that competition for resources does lead to greater intergroup hostility (Esses, Jackson, Dovidio, & Hodson, 2005; Quillian, 1995; Stephan et al.,

2002; Stephan & Stephan, 2000), the assumption that it is the primary cause of prejudice has been disputed. First, as we discussed earlier, ingroup loyalty emerges from interconnectedness and positive interdependence within the group, and the presence of competition with outgroups is not a necessary condition for its existence. Second, RGCT acknowledges that not only real, but also perceived threats that do not correspond to any real intergroup competition can lead to increased hostility. However, the theory does not suggest any answers to the question where exactly these perceptions of threat come from (Brown, 2010). Some of these unanswered questions and criticism became the starting point of the Social Identity Theory, to which we will return shortly. But let us now break the chronology of theories of intergroup relations and first discuss how the ideas of RGCT developed and were incorporated in later theories that see the primary cause of prejudice in perceptions of threat from outgroups.

Integrated Threat Theory

The theory of symbolic racism was originally introduced as a competing explanation to prejudice that placed the source of hostility towards outgroups in perceptions of threat to ingroup's values and norms rather than ingroup's resources (Bobo, 1983; Kinder & Sears, 1981; Sears & Henry, 2003). These two seemingly competing approaches were later integrated in the ITT as complementary to each other (Stephan & Stephan, 1996, 2000). ITT identifies four different types of perceived threat that can lead to prejudice. Essentially, anything that contributes to negative expectations from the outgroup can be considered a threat. This includes realistic threat as proposed in RGCT, symbolic threat as derived from symbolic racism literature, negative stereotypes, and intergroup anxiety. Intergroup anxiety is an anticipation of emotional discomfort from interactions with outgroup members that arises from uncertainty that such interactions can induce (Stephan & Stephan, 1985).

Several antecedents of these types of threat have been identified. Negative contact with outgroups or prior intergroup conflict contributes to increased perceptions of threat (Stephan & Stephan, 2000). Status differences play an important role as well. The greater the status differences, the higher levels of threat can be observed (Stephan et al., 2002), and threat has a stronger effect on attitudes towards low-status compared to high-status outgroups (Bettencourt, Charlton, Dorr, & Hume, 2001; Cadinu & Reggiori, 2002). In a study of attitudes towards affirmative action, perceptions of personal relevance of the issue increased perceptions of all types of threat, and ingroup identification was related to increased intergroup anxiety (Stephan & Stephan, 2000). In a more recent development of the theory, authors propose that negative stereotypes might also be more suited to be among the antecedents of the other three types of threat rather than one of them (Stephan et al., 2002).

The ITT has been successfully used to predict racial and gender attitudes, attitudes towards various immigrant groups, people with AIDS and other groups (Riek, Mania, & Gaertner, 2006). However, conceptual ambiguities still remain. For example, based on the results of a meta-analysis, Riek et al. (2006) propose a different causal model, where group identification and stereotypes lead to realistic, symbolic, and group esteem threat, which in turn lead to intergroup emotions, including intergroup anxiety, anger, fear, etc., and these emotions finally result in negative outgroup attitudes and behaviors. More evidence is needed to test these causality assumptions. But let us now go back to Social Identity Theory, which provides the broad theoretical framework for this dissertation.

Social Identity Theory

With Piage and Tolman laying the groundwork in 1930s and 1940s, cognitive approaches to psychological phenomena started revolutionizing the discipline in the late 1950s. As part of this broader movement, social categorization as the cognitive enabler of prejudice came to the fore. Henri Tajfel, a Polish-born former prisoner of war of Jewish

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origin, who lost all of his family in the Holocaust and who survived it by assuming a French identity, was the one to firmly establish the issues of social categorization and identification as central to the psychology of prejudice.

Some basic assumptions of SIT are formulated already in Tajfel's earliest publications. Drawing on studies of motivational factors influencing perception (experiments within the New Look movement; e.g. Bruner's work on overestimation of size or weight resulting from object's symbolic value), Tajfel (1957) postulates: (1) when social objects are classified, perceiver will overestimate the differences between two classes of objects and underestimate differences within the class of objects; (2) these processes will be particularly pronounced when the judgments are made on dimensions of value. Experiments conducted in the 60s with non-social (line length estimation) and social stimuli (national attitudes and preference of own group in children) (Tajfel, 1969; Tajfel & Wilkes, 1963) resulted in a formulation of a broader set of assumptions where the future SIT can be recognized. In addition to the originally proposed idea that categorization affects perception through under- and over-estimation of differences, two other key propositions are introduced: first, people identify with the groups they belong to, and second, people are in search for coherence, meaning they strive to find such causal attributions that will be consistent with one's social reality and at the same time, preserve one's self-image (Tajfel, 1969).

SIT was fully formalized (Tajfel & Turner, 1979) following a series of experiments conducted in the 70s (Billig & Tajfel, 1973; Tajfel, 1974; Tajfel, Billig, Bundy, & Flament, 1971) using the minimal group paradigm. The concept of minimal groups was introduced to explore the emergence of bias is circumstances when groups are created based on a random, meaningless criteria, members of the groups do not have face-to-face interaction or common history, and intergroup relations are not defined by any current or past conflicts. The fact that Tajfel and colleagues repeatedly observed behaviors that would advantage the ingroup and

disadvantage the outgroup in such non-conflictual contexts was groundbreaking and put categorization processes at the center of prejudice formation.

The SIT makes several assumptions that received considerable empirical support in the years to follow. The most fundamental assumption of SIT is that social categories not only structures the social world around, but also "provide a system of orientation for self-reference: they create and define the individual's place in society" (Tajfel & Turner, 1979, p. 40). From this inevitably follows that our group memberships become part of our self-concept and self-image. Through this, the motivation for positive self-esteem transfers to the groups that we see ourselves belonging to. The desire to see one's membership groups in a positive way, i.e. to achieve and maintain positive social identity, is fulfilled by comparing own membership groups with outgroups. This social comparison is a necessary, but not sufficient condition for intergroup bias to emerge.

The theory suggests several conditions under which the need for positively distinctive social identity will transform to outgroup hostility. First, perceived permeability of group boundaries determines whether moving from one group to another is possible. If group boundaries are permeable, low-status outgroups will show preference for the higher-status groups and strive for changing their membership group to that of a higher status. If the group boundaries are perceived to be impermeable, a shift from individual to intergroup strategies of identity maintenance will occur. In this case, several outcomes are possible. If the status relations are perceived as legitimate and stable, lower-status groups might internalize the negative images held by the higher-status outgroups about them. This, often missed, notion of consensual prejudice present in SIT can account for findings showing outgroup favoritism that System Justification Theory often uses as a point of criticism for SIT (Jost et al., 2004). Another "way out" for the members of low-status groups with impermeable group boundaries that the theory proposes are the strategies of social creativity. This can involve changing the

comparison group; making comparisons on a different dimension, on which the ingroup can be seen more positively; or re-evaluating the relevant dimensions to change the values assigned to the attributes of the group (authors use "Black is beautiful" as an example for this strategy). If the status relations are perceived as illegitimate and unstable, social competition occurs, which can take the form of discrimination, intergroup conflict, or collective action aimed at changing the existing status relations.

SIT provides a comprehensive account of prejudice formation following basic cognitive processing. However, coming back to the topic of this dissertation, it does not say much about the psychological processes behind impression formation in situations when more than one relevant and salient categorization dimension is present. Self-Categorization Theory (SCT; Turner et al., 1987) introduced a decade later takes us one step closer to addressing this question. SCT is concerned with questions of how categories are activated and used in impression formation. It stands in opposition to the view that categories are automatically activated when relevant cues are present (Bargh, 1989; Devine, 1989). Instead, SCT describes categorization as a process.

The theory builds on two assumptions. First, all perception is a result of categorization, and the question we should be asking is not whether or not we categorize, but at which level of abstraction categorization occurs. Building on the idea of interpersonal – intergroup continuum proposed earlier in Social Identity Theory (SIT; Tajfel & Turner, 1979), SCT argues that the varying levels of abstraction in categorization process is what differentiates individuated and stereotypical impression formation. Categorization at the group level would capture within-group similarities and between-group differences, whereas categorization at the individual level would capture intra-personal consistency and interpersonal differences. Second, SCT views categorization as a context-dependent process as opposed to the view of categorization as activation of cognitive structure (Turner, Oakes,

Haslam, & McGarty, 1994). Studies conducted within this framework demonstrate how categorization is determined by the interaction between perceiver's characteristics (perceiver readiness, e.g., motivation, values) and the context characteristics (comparative and normative fit: how well the category captures similarities and differences and how appropriate it is in the given context). Multitude of studies on categorization of multiracial individuals with both children and adult samples provides strong support for the theory, demonstrating how categorization outcomes vary depending on both perceiver and context characteristics (Gaither, Pauker, Slepian, & Sommers, 2016; Ho, Roberts, & Gelman, 2015; Pauker, Meyers, Sanchez, Gaither, & Young, 2018; Pauker, Williams, & Steele, 2016).

Although SCT does not directly address the question of impression formation when many group memberships are simultaneously salient, this theoretical framework and the empirical evidence it generated suggests that how people process the information about others under such circumstances will depend on the perceiver's and the context characteristics. Let us now focus more specifically on studies that did address the issue of impression formation in multiple categorization settings.

Beyond ingroup versus outgroup: Multiple and crossed categorization studies

All studies that include more than one dimension of social categorization when investigating intergroup perceptions and behavior fall into the group of multiple categorization studies. Historically, the label "crossed categorization" has been used to refer to studies with two intersecting dimensions of social categorization. To differentiate the two types of research designs, we will use the term "crossed categorization" when discussing studies with two crossing dimensions of categorization, and "multiple categorization" when referring to studies where more than two dimensions are used.

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Crossed categorization paradigm

The crossed categorization paradigm emerged in the SIT framework as a way to reduce intergroup bias. The category differentiation model (Deschamps & Doise, 1978; Doise, 1978) suggests that when only a single categorization dimension is salient ("simple categorization"), intergroup differences and intragroup similarities are accentuated, which results in intergroup bias, as SIT predicts. However, if the second, orthogonal dimension is introduced, it can reduce perceived intragroup similarity on the first dimension, as this second dimension splits the ingroup into two. It can also reduce perceived intergroup differences, as part of the outgroup members on the second dimension are ingroup members on the first. The prediction of this model is that introduction of the second categorization dimension will eliminate intergroup bias.

This assertion received only partial support. Most crossed categorization studies follow the original paradigm by asking respondents to evaluate four targets described in terms of their two crossed group memberships. If a participant is a female psychologist, the targets would be: a female psychologist (double ingroup, II), a female physicist (partial ingroup, IO), a male psychologist (partial ingroup, OI), and a male physicist (double outgroup, OO). Evidence accumulated thus far suggests that the most common pattern of evaluations in such experiments is the additive pattern, when the double ingroup is evaluated most positively, partial ingroups less positively (but still more positively than in simple categorization), and double outgroups negatively (Brewer, 1968; Brown & Turner, 1979; Ensari & Miller, 2001; Hewstone et al., 1993).

Meta-analytical evidence shows the additive pattern to be the default of impression formation in crossed categorization studies (Migdal et al., 1998; Urban & Miller, 1998). However, there are also significant deviations from this baseline pattern, especially in studies where real, instead of artificial, social groups are used. We will discuss in more detail the

specific evaluative patterns in crossed categorization paradigm in Chapter 3. Here, we will consider more general theoretical developments concerning moderators involved in the process of impression formation in crossed categorization settings.

The dual-route model of crossed categorization effects (Crisp, Ensari, Hewstone, & Miller, 2003) seeks to explain how different moderators lead to certain deviations from the additive pattern. The model distinguishes between affective and cognitive mediational routs. Positive and negative affect are the moderators that operate through the affective route. Positive affect (positive valence of mood, ingroup primes) results in more positive evaluations of mixed target and the double ingroup. Negative affect (negative valence of mood including cognitive overload, outgroup primes) results in more negative evaluations of the mixed target and the double outgroup.

Discrepant importance of categorization dimensions, access to individuated information, and contextual inclusiveness are the moderators that operate through the cognitive route. If one of the categorization dimensions is more important than the other (importance being the consequence of higher category salience due to accessibility and fit), that dimension will drive the attitude and the second dimension will be ignored. Individuated information and contextual inclusiveness predict when de-categorization or re-categorization will occur. Access to individuated information might lead to personalization and de-categorization, when target is not judged based on its group memberships anymore, but rather as an individual. Adding a superordinate group to which all targets and the participant belong introduces an inclusive context, which could result in re-categorization of all targets in terms of this shared superordinate group memberships, and hence, eliminate bias.

The refined version of the dual-route model of crossed categorization is presented in Figure 3 (Crisp & Hewstone, 2007). All moderators described by Crisp and colleagues (2003) are incorporated in this model. As Figure 1.3 shows, the model in its present form goes

beyond the two-group paradigm. It suggests that with increasing number of categorization dimensions to consider, category-based assessment will be abandoned and de-categorization will occur. So, let us now take a closer look at studies that investigated impression formation in multiple categorization settings beyond the two-group model.
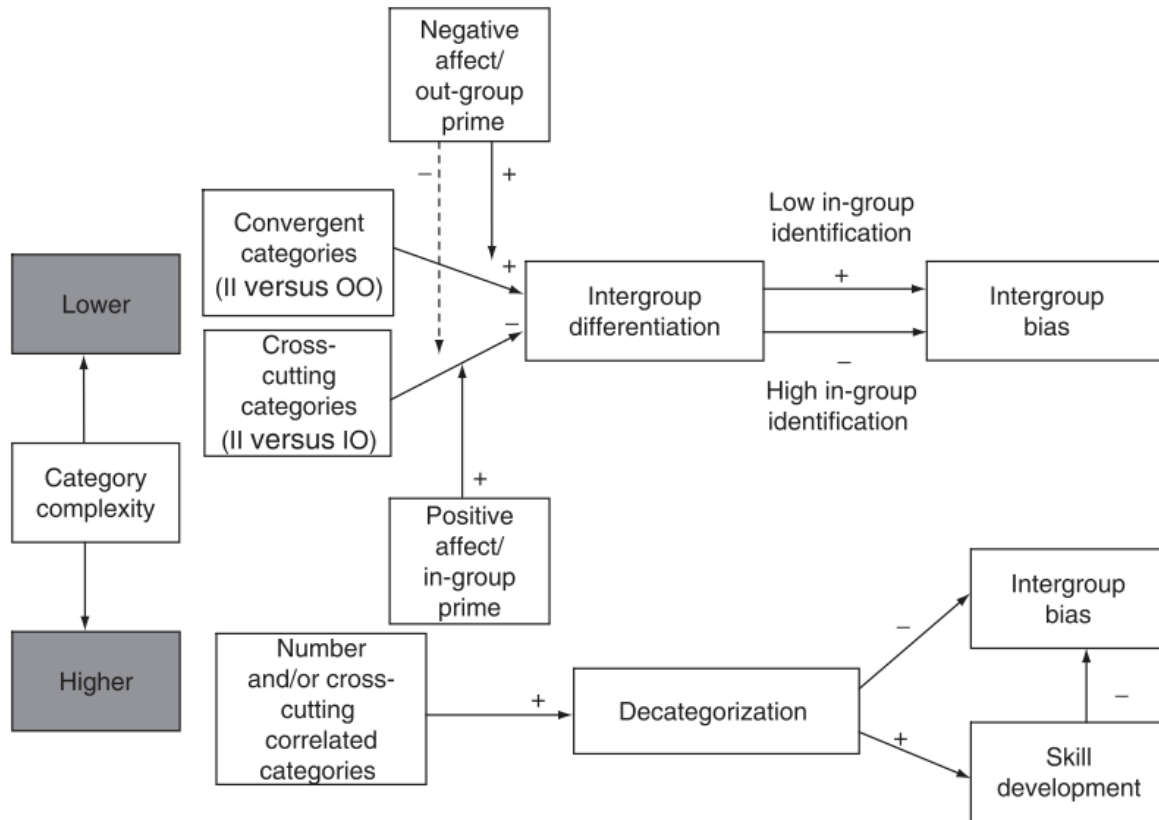
Figure 1.3. A differentiation–decategorization model of multiple categorization effects (adopted from Crisp & Hewstone, 2007)

Beyond the two-group model

Most studies focusing on multiple categorization effects beyond the two-group model are concerned with the question whether or not multiple categorization can further reduce intergroup bias. For example, Crisp et al. (2001, Experiment 2) compared evaluations of ingroup and outgroup targets on the sample of undergraduate students. The effect of multiple categorization on intergroup bias was assessed by comparing a simple categorization condition (Cardiff University student versus Bristol University student) with multiple

categorization conditions, where either multiple ingroup or multiple outgroup memberships were added to the baseline dimension. Although intergroup bias was present in all three conditions, it was significantly reduced in multiple categorization conditions, especially in the evaluations of outgroup members. Authors interpret this as a result of individuation that occurs when multiple group memberships are salient. Follow-up studies replicated this finding using spontaneous generation of alternative categorization dimensions; however, the reduction in intergroup bias was observed only when the alternative classifications were not related to the baseline categorization dimension (Hall & Crisp, 2005).

In a similar vein, a series of studies were conducted on undergraduate student samples in Italy to investigate whether multiple categorization can reduce dehumanization. One study found reduction in dehumanization outcomes towards Blacks in multiple categorization condition versus simple categorization condition (Albarello & Rubini, 2012). Moreover, priming inclusive human identity further improved attitudes towards Blacks. This positive effect of multiple categorization on humanization of outgroups reproduces irrespective of whether the additional group memberships are all ingroup, all outgroup, or mixed (Prati, Crisp, Meleady, & Rubini, 2016). It also generalizes across various target groups, including students, racial outgroups, immigrants, and linguistic outgroups (Prati et al., 2016; Prati, Menegatti, & Rubini, 2015). This series of studies supports the assumption made earlier that the positive effect of multiple categorization is mediated by increased individualization.

The positive effect of multiple categorization on reducing intergroup bias and outgroup dehumanization appears to be robust. However, the question of mechanisms behind impression formation in terms of information processing is not fully addressed in these studies. The only study so far to look into these processes beyond the two-group model is a study conducted by Urada, Stenstrom, and Miller (2007). Across four studies, researchers manipulated the number of categorization dimensions (from one, simple categorization, up to

four) to investigate whether evaluative patterns that were found for the two-group model hold when the number of dimensions increases. Participants were mainly undergraduate students from US universities. The dimensions were not fully crossed, instead either a number of ingroup or a number of outgroup memberships were added to the baseline simple categorization.

Based on the evaluation patterns of targets with different number of in- or outgroup memberships, authors conclude that when the number of dimensions increases, individuals use feature-detection strategies of information processing. There is a certain threshold, which depends on group membership on the important (dominant) categorization dimension and the number of in- or outgroup memberships on other dimensions. Targets are re-categorized into in-group-like or out-group-like based on where they fall relative to this threshold. Their evaluations are similar to ingroup evaluations if the target is placed in the "in-group-like" category and similar to outgroup evaluations if the target is placed in the "out-group-like" category.

Gaps and limitations of crossed and multiple categorization studies

Limitations of this body of literature can be grouped into two broad clusters. First, there are a number of unanswered questions that have not been empirically or conceptually addressed yet. We will refer to those as gaps. Second, there are number of methodological shortcomings that we will summarize below; we will refer to those as limitations.

Gaps. Studies utilizing real social groups in designing experimental manipulations repeatedly find some dimensions having a stronger effect on attitudes than others. This is intuitive, as we know from numerous real life examples that not every group membership matters to the same degree. Discrimination based on hair color cannot be compared with racial or religious discrimination. However, surprisingly little has been done to understand what makes certain dimensions of social categorization more or less important in impression

formation process. The only moderator tested so far has been affective valence of mood, which is usually primed. Hence, multiple categorization research does not make use of the rich literature on intergroup relations to address the issue of category dominance. Do we pay more attention to those dimensions that are more threatening? On which we identify ourselves more strongly? On which we perceive more intergroup conflict? This is one group of questions that needs to be addressed.

Multiple categorization studies provide an excellent setup for testing functions of different types of groups and the ways they impact impression formation. For example, does belonging to the same religious or ethnic group have the same impact on attitudes as belonging to the same educational or income group? If not all group memberships give rise to intergroup bias, does it mean they have no effect on attitudes? Or do they simply affect attitudes through different routes? These questions have not received any attention from multiple categorization researchers yet.

Finally, the role of context has been largely ignored. Presence of a superordinate group has been investigated as a contextual moderator (Crisp, Walsh, & Hewstone, 2006). However, it could be more accurate to describe a shared superordinate group membership as the third dimension rather than a contextual moderator. None of the studies conducted so far considered the role of a broader social and cultural context in the processes of impression formation in multiple categorization.

Limitations. One of the most important limitations of crossed categorization literature is that little is known about mechanisms of impression formation beyond the two-group model. None of the studies with more than two dimensions use a fully crossed design. This has been attributed to methodological challenges of having a high number of independents variables (dimensions of categorization) in a full factorial design (Nicolas et al., 2017). Absence of such studies restrains our ability to argue for or against the generalizability

of mechanisms of impression formation identified in two-group models to multiple crossed categorization settings.

Second important limitation of this body of literature is that more often than not they rely on artificial groups designed in laboratory settings. Such findings are important for identifying causal mechanisms, but they greatly limit the generalizability claims that can be made. Moreover, many relevant research questions (see above) can be addressed only if real social groups are used.

Last, but not least, this research relies heavily on single-country studies with undergraduate student samples that are highly homogeneous in terms of their cultural and socio-economic background. If we are to investigate the limits of generalizability of psychological theories, we have to start recruiting more diverse samples and conducting more cross-cultural studies. With these gaps and limitations in mind, we can now present the theoretical and methodological framework of the current project.

Multiple crossed categorization: Theoretical framework of the dissertation

We pursue two broad goals in this project. First, we aim to test the generalizability of mechanisms of impression formation identified in studies of crossed categorization with two groups to cases of multiple categorization. Second, we aim to investigate individual and country-level determinants of strength of bias in multiple categorization settings. To overcome some of the limitations of prior research, we (1) use real social groups selected based on interviews with local experts on intergroup relations, (2) employ a fully crossed factorial design, manipulating up to nine membership groups, (3) recruit diverse samples across five countries.

Below we present two sets of hypotheses, addressing the two broad research questions of the project. The first set of hypotheses is concerned with mechanisms of impression formation in multiple categorization settings: the role of perceived similarity and the

generalizability of crossed-categorization patterns to cases of multiple crossed categorization. The second set of hypotheses aims to explain the strength of bias occurring on various dimensions of categorization: we propose both individual and contextual variables that could explain why certain categorization dimensions have more impact on attitudes than others.

Perceived similarity

The reduction in bias repeatedly observed in crossed categorization studies is attributed to perceived similarity (Crisp & Hewstone, 2007; Deschamps & Doise, 1978). Adding group memberships that the perceiver and the target share brings the target closer to the perceiver, increasing perceiver-target similarity and improving attitudes. We hypothesize that in a multiple categorization settings, shared group membership on each categorization dimension increases perceived participant-target similarity (H1a, Chapter 2) and perceived similarity mediates the link between shared group membership and attitude for all categorization dimensions (H2, Chapter 2). Although the differentiation-decategorization model of multiple categorization (Crisp & Hewstone, 2007) suggests that with increasing number of group memberships category-based information processing will not be used, there is no empirical evidence suggesting that increasing number of shared group memberships will not increase perceived similarity and improve attitudes.

Previous studies did not differentiate between groups of different nature when making predictions about crossed-categorization effects. We argue that shared group membership is the primary driver of perceived similarity for horizontal dimensions of categorization, such as ethnicity or religion, but not for vertical dimensions indicating status, such as education, occupation, and income. We build on arguments developed within the frameworks of System Justification Theory (SJT, Jost, Pelham, Sheldon, & Sullivan, 2003) and SIT to suggest that higher-status others will be perceived as more similar even if they do not share a group membership with the perceiever. This can be attributed to a desire to dis-identify with the

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stigmatize lower-status group and perceive oneself as closer to higher-status others. Therefore, we hypothesize that target's higher status on status-related categorization dimensions increases perceived similarity over and above shared group membership on those dimensions (H1b, Chapter 2).

Finally, building on the argument that with increased number of group memberships to consider, perceiver will use non-algebraic, threshold-based models of information processing (Urada et al., 2007), we hypothesize that based on perceived participant-target similarity, all targets will fall into two clusters of "in-group-like" and "out-group-like" others (H3, Chapter 2).

Patterns of evaluation

Patterns of crossed categorization describe how the four targets in a classical crossed-categorization design are evaluated. We discussed earlier the additive pattern, when the double ingroup is evaluated most positively, followed by two mixed targets, and then the double outgroup. This is the baseline pattern of evaluations in crossed categorization, when no moderators are involved (Migdal et al., 1998; Urban & Miller, 1998). Several other patterns have been described in the literature, such as category dominance (only one of the two dimensions affects the attitude) or equivalence (no differentiation between targets). As no studies have yet investigated these patterns in multiple crossed categorization settings, we take an exploratory approach in testing the applicability of these patterns. We develop predictions (see Table 3.1, Chapter 3) by translating the mean comparison approach used in 2x2 designs (e.g., prediction for additive pattern: ii < io = oi < oo) to a regression analysis approach for multifactorial designs (e.g., prediction for additive pattern: there is a positive linear relationship between the number of shared group memberships and the attitude).

Individual-level determinants of bias

We apply three established theories of intergroup relations to explain the differential impact of various categorization dimensions on attitudes documented in crossed categorization literature (Crisp & Hewstone, 2007). Based on the assumptions of SIT, we predict that the higher the importance of categorization dimension to the self, the stronger is intergroup bias on that dimension (H1, Chapter 4). Predictions developed from RGCT suggest that the higher the perceived salience of intergroup conflict on a categorization dimension, the stronger is intergroup bias on that dimension (H2, Chapter 4). Finally, ITT predicts that the higher perceived symbolic threat from the outgroup, the stronger is intergroup bias on the dimension (H3, Chapter 4). Applying these three established theories of intergroup relations to multiple crossed categorization settings allows not only addressing the question of why certain categorization dimensions dominate impression formation, but also provides a test of generalizability of the theories across categorization dimensions and contexts.

Country-level determinants of bias

To formalize the link between country-level cultural context and the role various dimensions of social categorization play in impression formation, we take the typology of social groups described earlier as horizontal and vertical one step further. We differentiate between two types of groups. The first type of groups are the groups that can be characterized by cooperative interdependence (Brewer & Caporael, 2006). These groups are structured, have clear boundaries, and a set of rules, norms, and moral prescriptions that regulate the behavior of its members to ensure reciprocity and cooperation. Typical examples include groups that reflect cultural differences: ethnicity, nationality, religion. Others' memberships in such groups will have an effect on attitudes primarily through the mechanism of ingroup

bias: those who are expected to reciprocate, as they abide by the same rules and norms (ingroup), will be preferred over those who are not (outgroups).

However, not all social groups signal how likely it is for the other person to reciprocate. If the group members are not bound by shared norms and morality, information about these group memberships will not be useful and the group membership will not affect attitudes. However, the information about whether or not the other's behavior is regulated by the same set of norms as your own is not the only piece of useful information that group memberships can provide. As we know from various independent lines of research on perceiving others, at least two key dimensions of perception can be differentiated: warmth and competence (Fiske, Cuddy, & Glick, 2007). Whereas cooperative intent will signal warmth, status will signal competence. Hence, such group memberships as education, occupation, and income might not affect attitudes via ingroup bias (as they do not have clearly defined group boundaries and normative or moral regulations for their members), but will affect attitudes via the mechanism of preference for higher status.

We expect the effects of these two types of group memberships on attitudes to be affected by the characteristics of the context. Building on the assumptions of Group Norm Theory which suggests that prejudice is a product of socialization (Crandall, Eshleman, & O'Brien, 2002; Paluck, 2009; Sherif & Sherif, 1953) we expect intergroup bias on cultural dimensions of social categorization, such as ethnicity and religion, to be weaker in countries where acceptance of cultural diversity is the societal norm. The role of status-related dimensions will depend on the level of inequality in the country. Countries with lower levels of inequality have higher social mobility (higher permeability of group boundaries) and stronger meritocratic beliefs (higher legitimacy of status relations). SIT predicts preference for higher-status others under conditions of high permeability of group boundaries and legitimacy of status relations (Naomi Ellemers, van Knippenberg, De Vries, & Wilke, 1988;

Tausch, Saguy, & Bryson, 2015). We therefore expect the status-related dimensions of social categorization, such as education, occupation, and income, to have stronger effects on attitudes in countries with lower levels of inequality. Figure 1.4 summarizes the hypotheses developed in this section.
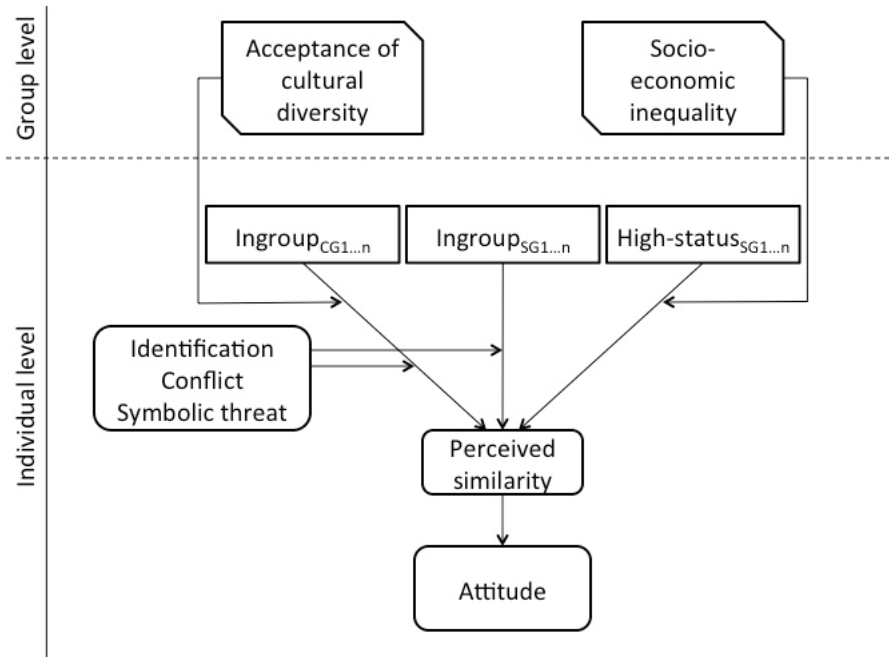
Note. CG – cultural group, SG – status group, 1…n – number of categorization dimensions.

Figure 1.4. Summary of predictions

CHAPTER 2

PERCEIVED SIMILARITY IN MULTIPLE CATEGORIZATION

Abstract

As the diversity of modern societies becomes more structurally complex, the importance of studying multiple cross-cutting group memberships increases as well. The present study investigates the causes and consequences of perceived similarity in multiple categorization settings. In a factorial survey with six ethnic groups in Russia (N = 524 participants, 5036 observations), this study examines the effects of eight real-life social categories (ethnicity, religion, gender, age, education level, proficiency in Russian language, job skill level, and immigration background) on perceived similarity and attitudes. Findings show that ingroup membership on each categorization dimension increases perceived similarity with the target and that high-status others are evaluated as more similar even if they do not share these group memberships with the participant. The path analysis results indicate that participants' attitudes towards the target person are mediated by perceived similarity for all categories. Findings also suggest that all judgments of targets fall into two clusters, which can be described as "in-group-like" and "out-group-like" others. The implications for information processing in image formation are discussed. These findings provide strong evidence for the large explanatory power of perceived similarity in judgments of others when multiple group memberships are salient.

Researchers in various areas of the social sciences highlight more and more the importance of looking at societies not as dichotomized entities that include "majority" vs. "minority" groups, or any other single form of "us" vs. "them", but as increasingly diverse entities that can be categorized along many different dimensions. Be it the concepts of intersectionality (Collins, 2015) or super-diversity (Vertovec, 2007) in sociology, or the concepts of polyculturalism (Morris, Chiu, & Liu, 2015) or multiple and crossed categorization in psychology (Crisp & Hewstone, 2007), the basic idea is the same: to understand how individuals and societies function, we need to understand how co-occurrence and interaction of multiple group memberships result in new perceptions and relations between individuals and groups. This study looks into attitude formation when multiple social categories co-occur. More specifically, it focuses on perceived similarity and its mediating role in the relationship between group membership and attitudes towards a person.

Perceived similarity is at the core of group formation and intergroup relations processes. As Self-Categorization Theory (SCT) suggests, social categories emerge from the assessment of social objects as similar or different, and a category is formed when it is efficient in capturing intragroup similarities and intergroup differences (Turner et al., 1987). Once the social group is formed, perceived similarity affects the way different outgroups are perceived. Findings in various fields of psychology support this claim. People like others who are similar to them in terms of physical and psychological characteristics (see meta-analysis by Montoya, Horton, & Kirchner, 2008). Studies on social interactions with outgroups and interethnic friendships and marriages indicate the same trend: perceived similarity affects how open people are to social interactions with outgroups (Roccas & Schwartz, 1993), and whom they choose as friends and partners (Huijnk, Verkuyten, & Coenders, 2010; McPherson, Smith-lovin, & Cook, 2001; Muttarak, 2014; Schachner et al., 2015).

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Despite the crucial role that perceived similarity plays in intergroup relations, we know very little about the causes and consequences of perceived similarity in multiple categorization settings. The main research question that this study aims to answer is how perceived similarity is formed and how it affects attitudes towards a person when multiple group memberships co-occur. To address this question, I conduct a factorial survey (vignette) study where I use eight real-life dimensions of social categorization to construct vignettes with descriptions of imaginary people that represent eight different group memberships simultaneously. I then test how shared group membership and status differences on these dimensions affect the perception of participant-target similarity, and whether perceived similarity mediates the link between shared group membership and attitude towards a target person. This study is the first attempt to address the issue of causes and consequences of perceived similarity in multiple categorization settings.

Predictors of perceived similarity

Traditionally, in psychological literature, perceived similarity is viewed as an explanatory variable that leads to several outcomes on the individual and group levels. However, there are very few studies investigating determinants of perceived similarity towards social targets. I aim to fill this gap by looking at group membership on various categorization dimensions, as well as the status of the target person, as predictors of perceived similarity.

It is intuitively straightforward to assume that actual (or objective) similarity predicts perceived similarity. Maybe that is why very few studies explicitly tested this assumption. Those few studies that did look at the link between actual and perceived similarity support this intuition. In a study of teams in an organizational setting, Zellmer-Bruhn, Maloney, Bhappu, & Salvador (2008) show that actual diversity in terms of nationalities and ethnicities represented in a team negatively related to perceived similarity of the group members. In a

very different context of interpersonal communication in dyads, Wildman (2010) found that cross-ethnic dyads reported less perceived similarity in beliefs and attitudes compared to same-ethnicity dyads.

These findings apply to simple categorization settings. Zellmer-Bruhn and colleagues (2008) assessed team diversity in terms of nationalities, ethnicities, and gender, but the perceived similarity score was based on questions only about nationalities and ethnicities. This resulted in the absence of a relationship between objective gender diversity and perceived similarity. We, instead, assess perceived similarity as a general perception of a person that belongs to several social groups simultaneously. Our prediction is that *in a multiple categorization setting, shared group membership on each categorization dimension increases perceived participant-target similarity (H1a)*.

Although actual similarity is the most obvious determinant of perceived similarity, there are various structural factors that might have an effect on how similar different outgroups are perceived to be. Probably the most important one is status differences between the groups. Several studies have shown that high-status outgroup members are often perceived more positively than ingroup members (Jost & Burgess, 2000). We expect that high-status others are also perceived as more similar, for two reasons referring to two different mechanisms.

The first mechanism is rooted in system justification theory, which suggests that people tend to justify the existing social order, even among disadvantaged groups (Jost et al., 2003). The authors explain this phenomenon through dissonance reduction. If this is the case and system justification can result in more positive attitudes towards higher-status others, then the dissonance can be further reduced by bringing perceived similarity in agreement with these positive attitudes.

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The second possible mechanism is based on self-esteem considerations rooted in Social Identity theory (SIT; Tajfel & Turner, 1979). Lower group status is associated with lower self-esteem (Morse et al., 1970). To cope with negative social identity, low-status groups can employ different strategies of identity management (Blanz, Mummendey, Mielke, & Klink, 1998), one of which is assimilation. Even if actual social mobility is not possible, members of disadvantaged groups may still increase their self-esteem by perceiving themselves as being more similar to higher-status outgroups.

Both mechanisms described above apply only to low-status groups perceiving high-status targets as more similar. If high-status groups perceive a high-status target person as similar because of shared group membership on the status-related dimension, and low-status groups perceive them as more similar despite the absence of shared group membership, this should result in target's higher status having an effect on similarity over and above the effect of shared group membership. Based on this assumption, I hypothesize that *target's higher status on status-related categorization dimensions increases perceived similarity over and above shared group membership on those dimensions (H1b).*

Outcomes of Perceived Similarity

Perceived similarity has a variety of positive outcomes both in interpersonal and intergroup relations. A meta-analysis of 313 studies (Montoya et al., 2008) of the similarity-attraction hypothesis (Byrne, 1971) in interpersonal relations showed that perceived similarity is strongly related to attraction in no-interaction, short interaction, and existing relationships studies. Actual similarity had a strong effect on attraction only in no-interaction studies, a much weaker effect in short interaction studies, and no effect in existing relationships studies.

Within the group of studies that focus on intergroup relations, three relatively distinct outcomes of perceived similarity have been identified. First, people prefer to form friendships

with those who are similar to them (the phenomenon called homophily), especially when it comes to inter-ethnic friendships (McPherson et al., 2001; Muttarak, 2014; Schachner et al., 2015). Second, the same is true for marriage, where perceived similarity is an important predictor of partner choice (Dribe & Lundh, 2011; Kalmijn, 1998). Finally, acculturation studies show that the less pronounced cultural distance between the immigrant's home culture and the new culture is perceived, the easier it is for them to integrate into the receiving society (Galchenko & van de Vijver, 2007; Searle & Ward, 1990).

Despite the overwhelming evidence from field studies supporting the similarity-attraction hypothesis, both on interpersonal and intergroup levels, some experimental studies conducted within the framework of Social Identity theory show an opposite trend (Branscombe, Ellemers, Spears, & Doosje, 1999; Hornsey & Hogg, 2000). The theoretical argument behind this effect is that, according to SIT, people have a need for a positively distinct social identity, and if the distinctiveness of the group is threatened by high levels of intergroup similarity, this might lead to more ingroup bias or greater intergroup differentiation (Tajfel & Turner, 1979). There are several conditions that have to be met for this effect to occur. A meta-analysis by Jetten, Spears, & Postmes (2004) shows that the negative effect of similarity occurs only when the outcome measure is behavioral and only among those who strongly identify with the ingroup. When judgments are used as criteria for intergroup differentiation (or bias), the effect of similarity is positive.

Considering that in this study I do not manipulate distinctiveness threat but measure perceived similarity itself and the outcome measure is an attitude, not behavior, the predictions should be derived from the body of literature described earlier. Hence, I expect a positive link between perceived similarity and attitudes towards a person. As I look at perceptions of imaginary people, this study falls into the no-interaction category (Montoya et al., 2008). As noted earlier, in this context actual similarity was found to be related to

attraction as strongly as perceived similarity. Based on the argument that perceived similarity is affected by actual similarity introduced earlier, I suggest that the effect of actual similarity (shared group membership) on attitude is mediated by perceived similarity. Thereby I hypothesize that *perceived similarity mediates the link between ingroup membership and attitude for all categorization dimensions (H2).*

Perceived similarity in multiple categorization

The concept of similarity has been used to explain the effects of crossed categorization on intergroup bias. A classical crossed categorization setting involves two dimensions of categorization that cross each other to form four different targets: double ingroup member (II), double outgroup member (OO), and two targets with overlapping group memberships (IO and OI). In the study that introduced this paradigm, Deschamps & Doise (1978) showed that crossed categorization reduces intergroup bias and suggested that perceived similarity is responsible for this bias reduction. Introducing a second cross-cutting category helps to lower the degree of perceived similarity within the ingroup by dividing it into two, and increase perceived similarity between the groups by suggesting a shared group membership on the second dimension. Although not many studies explicitly tested the underlying mechanism based on similarity (but see Crisp, Ensari, Hewstone, & Miller, 2003 for further theoretical development), many did find evidence that crossed categorization reduces intergroup bias (see meta-analyses by Migdal, Hewstone, & Mullen, 1998 and Urban & Miller, 1998).

The evidence on perceived similarity in crossed categorization settings that include more than two dimensions is scarce. To the best of my knowledge, the study by Urada, Stenstrom, & Miller (2007) is the only one that used more than two crossing categories and included a measure of perceived similarity. The findings suggest that perceived participant-target similarity parallels preference scores for the target. Correlations between the two

measures varied from 0.44 to 0.67. Although the authors did not use this similarity score in their further empirical analysis, they argue that the assessment of targets that represent several social categories simultaneously follows gestalt-processing strategy, when targets are perceived either as "in-group-like" or "out-group-like". The pattern of observed preferences for mixed category targets is interpreted as supporting evidence for such information processing.

There are two different approaches to impression formation process that are often presented as opposing. One is a bottom-up approach, best represented by Anderson's (1981) Information Integration Theory. In this way of thinking, impression formation is a process of algebraic integration of all pieces of available information. Another is a top-down approach that emphasizes the role of categorization: the impression of a social object is a function of the category to which it has been assigned (Brewer, 1988). Continuing the tradition of contrasting bottom-up and top-down approaches to impression formation, Urada et al. (2007) differentiate algebraic and non-algebraic predictions for crossed-categorization effects. After finding support for more complex processing than an additive pattern would predict (summing up different pieces of information), the authors conclude that non-algebraic gestalt-processing strategy is used in the cases of crossed-categorization with more than two dimensions. We test this assumption by applying a different analytical strategy, which is based directly on perceived participant-target similarity scores. In line with the findings by Urada and colleagues, we expect that the distribution of all perceived similarity scores should be bi-modal, and thus fall into two clusters. So, our third and final hypothesis is that *based on perceived participant-target similarity, all targets will fall into two clusters: "in-group-like" and "out-group-like" others (H3).*

The context of the study

The study was conducted in Russia, an understudied region of the world. The Russian context was particularly interesting for investigating this topic, as both horizontal (ethnicity, religion, gender) and vertical (education, occupation, income) dimensions of social differentiation are pronounced here. We sampled six ethnic groups in a way that they represent minority groups with different standings in the Russian society. Three groups (Russians, Tatars, and Bashkirs) were indigenous to Russia and three others (Ukrainians, Armenians, and Azerbaijanis) were immigrant groups. These samples were also balanced in terms of predominant religion: three samples were majority Christian (Russians, Ukrainians, and Armenians), and three were majority Muslim (Tatars, Bashkirs, Azerbaijanis). Overall, these samples represent Russian society quite well, as Russians, Tatars, Bashkirs, and Ukrainians are the four largest groups in the country, and Armenians and Azerbaijanis are among the largest groups with immigration background. As the society is strongly differentiated both on the horizontal and vertical dimensions, it was particularly interesting to study how people combine sometimes inconsistent information to form impressions about others.

Method

Design and procedure

To identify dimensions of social categorization that were most relevant in the Russian context, we first conducted eight semi-structured interviews with local experts on intergroup relations (social psychologists, sociologists, anthropologists). The interview guide consisted of a list of relevant categorization dimensions that we developed based on a literature review, and an open-ended question. We asked the experts to rate these dimensions according to their importance and then to add any other characteristics that were not mentioned in the list. The resulting set of dimensions of social categorization together with the categories that were

used in the main study is presented in Table 2.1. The literature review to identify the

dimensions and a more detailed report on expert interviews can be found in the

Supplementary Material (SM).

Table 2.1. Dimensions of social categorization and categories used in the study

Dimension	Levels
Ethnic group	(1) Russian, (2) Tatar, (3) Ukrainian, (4) Bashkir, (5) Armenian, (6) Azerbaijani
Religion	(1) Christian, (2) Muslim, (3) Non-believer
Gender	(1) Male, (2) Female
Age	(1) 25 years old, (2) 45 years old, (3) 65 years old
Education	(1) No higher education, (2) Has higher education, (3) Has a PhD[1]
Knowledge of Russian language	(1) Almost does not speak Russian, (2) Speaks Russian, but not well, (3) Speaks Russian fluently
Job skill level	(1) Low-skilled worker (2) Skilled professional (3) Highly skilled specialist
Immigration status	(1) Was born in Russia, (2) Legally immigrated to Russia, (3) Illegally immigrated to Russia

Factorial survey design (Rossi & Anderson, 1982) was used to test the hypotheses.

This research design combines the advantages of experimental and field studies. The

vignettes are constructed by combining all levels of all dimensions (similar to a factorial

experiment), which in our case resulted in a set of 8748 vignettes. After excluding highly

implausible combinations of group memberships (e.g., "was born in Russia" with "almost

does not speak Russian"), 100 vignettes were sampled, which were then assigned to 10

different versions of a questionnaire. The sampling of the vignettes and the assignment to

different questionnaire versions were carried out in SAS, using the D-efficiency coefficient

(Duelmer, 2007). The D-efficiency coefficient, which varies from 0 to 100 and reflects the

strength of the design in terms of balance and orthogonality of representation of levels of

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vignette dimensions, was 89.8 ($SE = 0.44$), which can be considered good. The distribution of factor levels by vignette sets and more information on the D-efficiency coefficient can be found in Table S1.1 and a note to it in the SM.

This is an example of a vignette used in this study: "Ainur. 45 years old, Bashkir, Muslim. He was born in Russia, speaks Russian fluently. He has a university degree. He is a highly skilled specialist". Participants were asked three questions after each vignette to assess perceived similarity and attitude towards a vignette person. Each participant assessed 10 vignettes. Participation was voluntary and not incentivized. All participants were provided with a consent form before the survey started. The data were collected online, and participants were randomly assigned to one of the 10 versions of the questionnaire. The order of vignettes in each questionnaire was also randomized, to avoid any ordering effects.

Participants

A diverse group from the general population was sampled via social media platforms Facebook and VKontakte (Russian analog of Facebook) and online forums of ethnic Diasporas. The introduction to the survey link stated that the study is aimed at investigating how people from different cultural groups living in Russia perceive each other. Only two conditions were specified for participation: participants had to belong to one of the six ethnic groups studied and they had to be residents of Russia. No age restrictions were specified, however, we excluded 15 participants who reported to be less than 18 years old. The total sample size was N = 524. Not all of the respondents reacted to all ten vignettes, so the number of observations at the vignette level was $N = 5036$. Additional 131 observations

(2.6%) were excluded from the regression and path analysis as they contained missing values

on one or more variables[3].

The sample included representatives of six ethnic groups: Russians (N = 216), Tatars

(N = 57), Ukrainians (N = 37), Bashkirs (N = 95), Armenians (N = 74), and Azerbaijanis (N

= 45). Age varied from 18 to 68 years, with M_{age} = 29 (SD = 9.4). Sixty-three percent of

participants were female. As for religion, 45.8% of the participants identified as Christians,

30.9% as Muslims, and 19.1% as non-believers. In terms of language proficiency, 70.8%

reported Russian as their mother tongue and additional 26.9% were fluent in Russian. Ninety-

two percent of participants were Russian citizens, whereas 8% did not have Russian

citizenship. The majority of participants, 91%, were either obtaining or already had a tertiary

education degree; 9% did not attend college. Various occupations were reported, which were

coded into "low-skilled" (7.8%) and "skilled" (89.5%). Some 3% of participants did not

report their occupation. Table S1.2 in SM describes the coding scheme for identifying in- and

outgroup membership of the vignette person for a specific respondent on each dimension.

Measures

After the description of the target person in a vignette, participants were asked to

answer three questions about the vignette person. The first question measured *perceived*

similarity ("How similar do you think is this person to you"?). This single-item measure was

chosen to avoid participant fatigue, as the same questions had to be answered 10 times, once

for each vignette. Use of single-item measures is preferable in such cases, if the construct is

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[3] Thirty-four participants reacted to less than 10 vignettes. The mean similarity score in this group did not differ from the rest of the participants who reacted to all 10 vignettes. However, this group was slightly different from the ones who fully completed the questionnaire in their socio-demographic profile. They were younger and predominantly female; all of them were citizens of Russia. This group had a higher percentage of Russian and Tatar participants compared to the rest of the sample, as well as a higher percentage of non-religious and Muslim participants. We did not exclude these participants from the analysis as they constituted only 6.5% of the total sample and they did not differ from the others on the mean similarity score.

"doubly concrete" (Bergkvist, 2015), meaning it has a clear object ("this person") and a clear attribute ("similar to you"). Single-item measures of perceived similarity have been successfully used in previous studies (e.g., Simon, Pantaleo, & Mummendey, 1995; Spears, Doosje, & Ellemers, 1997).

The remaining two questions measured *attitudes* towards the vignette person: "Would you like this person to be your neighbor"? (modified question from Bogardus's social distance scale; Bogardus, 1933; Parrillo & Donoghue, 2005) and "Do you like this person"? All items had a 10-point response scale, from 1 (*not at all*) to 10 (*very much*). The two questions measuring attitude correlated at $r(5033) = 0.85$, $p < .001$ and the combined score of the attitude measure correlated with perceived similarity at $r(5026) = 0.54$, $p < .001$.

Measures of socio-demographic variables are reported in Chapter 3. All study materials, data, and syntax are available on the Open Science Framework platform: https://osf.io/8pxtq/?view_only=b8e896783fac4a32850c1945ffae743d.

Results

To test hypotheses H1a and H1b, a regression analysis was performed in Mplus 6.12. The nested structure of the data was taken into account by specifying the respondents' ID as a clustering variable. As no respondent-level variables were included and no random parameters specified, regression with clustered standard errors was preferred over multilevel modeling (Primo, Jacobsmeier, & Milyo, 2007). Both perceived similarity and attitude measures were centered within respondents to correct for respondent-level heterogeneity in response style (Allison, 2009). The model included two sets of predictors: in- or outgroup membership of the target person on each of the dimensions in relation to the respondent, and the target person's characteristics irrespective of the respondent's group membership. The first eight predictors represent whether the vignette person and the respondent share a group membership on the respective dimension (outgroup membership is used as a reference

category). The remaining predictors are the characteristics of the vignette person. The results are presented in Table 2.2.

Table 2.2. The effects of shared group membership and vignette dimensions on perceived similarity

| | | b | β | S.E. | 95% CI | | p−value |
					Lower	Upper	
Intercept		−.812	−.376	.245	−1.293	−.331	.001
Ethnicity (ingroup)		1.098	.178	.101	.900	1.295	< .001
Religion (ingroup)		.78	.168	.073	.636	.923	< .001
Gender (ingroup)		.146	.034	.057	.033	.258	.011
Age (ingroup)		.344	.075	.095	.157	.531	< .001
Education (ingroup)		.366	.078	.097	.177	.556	< .001
Language proficiency (ingroup)		.289	.066	.13	.034	.545	.027
Job skill level (ingroup)		.384	.086	.126	.137	.631	.002
Immigration status (ingroup)		.264	.061	.08	.106	.421	.001
Ethnicity	Azerbaijani	−.201	−.039	.145	−.485	.082	.164
	Tatar	.113	.017	.137	−.154	.381	.407
	Bashkir	.077	.012	.127	−.171	.325	.544
	Ukrainian	.017	.003	.139	−.254	.289	.900
	Armenian	−.119	−.023	.142	−.397	.159	.402
	Russian	*Reference*					
Religion	Not religious	.019	.004	.078	−.134	.172	.803
	Muslim	.058	.013	.078	−.095	.211	.455
	Christian	*Reference*					
Gender (female)		.111	.025	.058	−.004	.223	.058
Age	25	−.133	−.029	.100	−.330	.064	.185
	45	.048	.010	.069	−.087	.183	.488
	65	*Reference*					
Education	No higher education	−.467	−.096	.108	−.677	−.256	< .001
	Higher education	−.006	−.001	.064	−.133	.120	.922
	PhD	*Reference*					
Language proficiency	Doesn't speak	−.585	−.110	.148	−.874	−.295	< .001
	Speaks but not well	−.191	−.042	.136	−.457	.075	.159
	Fluent	*Reference*					
Job skill level	Low skilled	−.669	−.149	.136	−.935	−.402	< .001
	Skilled	−.092	−.020	.074	−.237	.053	.212
	Highly skilled	*Reference*					

		b	β	S.E.	95% CI		p−value
					Lower	Upper	
Immigration status	Born in Russia	−.349	−.069	.120	−.584	−.114	.004
	Immigrated legally	.153	.031	.106	−.053	.360	.146
	Immigrated illegally	Reference					

Note. BIC = 20478.6; AIC = 20296.7; R^2 = .218

The results suggest that shared group membership on each categorization dimension increased perceived similarity, providing support for H1a. The strength of the effect varied between the dimensions, with ingroup membership on the dimensions of ethnicity and religion having the strongest (β = .178 and β = .168, respectively) and ingroup membership on the dimensions of gender and immigration status having the weakest (β = .034 and β = .061, respectively) effects. By adding the vignette dimensions, we were able to demonstrate that in line with H1b, higher status on status-related dimensions, such as education, language proficiency, job skill level and immigration status increased perceived similarity over and above ingroup membership on those dimensions. The other dimensions that were not directly related to status differences (ethnicity, religion, age, gender) had an effect exclusively through ingroup membership.

A path model approach was used to test H2, looking at indirect effects of shared group membership on attitude, mediated by perceived similarity. The indirect and direct effects with corresponding 95% CIs are reported in Table 2.3. The results of the path analysis show that in all cases the effects of ingroup membership on attitude towards a person were mediated by perceived similarity. For seven out of eight categorization dimensions the mediation was full, i.e. only the indirect effects were significant and the direct effects were not. The only exception was religion—perceived similarity only partially mediated the effect of ingroup membership on attitude and the direct effect remained significant and relatively strong (b = .349, p < .001).

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Table 2.3. Indirect (through perceived similarity) and direct effects of ingroup membership on attitudes towards a person

	Indirect effect (through similarity)					Direct effect				
	b	S.E.	95% CI		p	b	S.E.	95% CI		p
			Lower	Upper				Lower	Upper	
Ethnicity (ingroup)	.568	.056	.458	.678	<.001	.139	.072	−.002	.280	.054
Religion (ingroup)	.404	.044	.318	.490	<.001	.349	.063	.224	.473	<.001
Gender (ingroup)	.075	.030	.016	.135	.013	.055	.048	−.149	.039	.255
Age (ingroup)	.180	.050	.083	.278	<.001	.112	.072	−.030	.254	.123
Education (ingroup)	.192	.050	.094	.290	<.001	−.052	.110	−.267	.163	.635
Language (ingroup)	.150	.068	.016	.284	.028	.033	.178	−.316	.382	.852
Job skill level (ingroup)	.199	.066	.070	.328	.002	.070	.085	−.096	.236	.406
Immigration status (ingroup)	.137	.042	.055	.219	.001	−.010	.075	−.158	.137	.892

Note. BIC = 39142.1; *AIC* = 38771.75; R^2 = .436

To test H3, a two-step cluster analysis was performed with no prior specification of the number of clusters to determine whether all vignettes can be grouped into "in-group-like" and "out-group-like" based on the perceived similarity score. The two-step cluster analysis uses an algorithm that integrates sequential and hierarchical approaches to clustering. In the first step, the computer algorithm compares each data entry with the next one and based on a similarity measure, each next entry is either combined with the previous one or is assigned to a new cluster. The outcome of this procedure is a cluster feature tree that is used as input for the second step. During the first step, the algorithm allows for outliers. Those entries that do

not fit into any of the clusters and are not numerous enough[4] to form a new cluster are considered outliers. In the second step, hierarchical clustering is applied to the sub-clusters identified in the first step. The optimal number of clusters is established by comparing the clustering criterion for solutions with different numbers of clusters (for more details about the algorithm, see Zhang, Ramakrishnan, & Livny, 1996).

In the current analysis, log-likelihood was used as a similarity measure and Schwartz's Bayesian Criterion (BIC) as a clustering criterion. The analysis was performed in SPSS 23. As the results of the first step depend on the ordering of cases, a variable containing random values was created and cases were ordered by these random values. Initially, the entire sample was used to determine the cluster solution. Subsequently, the analysis was repeated on two randomly selected halves of the data to check the robustness of the clusters. Finally, the predictive power of the clusters in explaining attitudes towards a vignette person was determined using ANOVA.

The two-step cluster analysis revealed a two-cluster solution with a silhouette measure of 0.7, which is considered good (Kaufman & Rousseeuw, 1990). The distribution of the two-cluster solution is presented in Fig. 2.1. After the first step of sequential clustering, 7.8% of observations were excluded from the analysis as outliers, and only the remaining 92.2% ($N = 4632$) of observations were clustered. The first cluster included 52.9% of observations with mean similarity score of $M_{sim} = 0.7$ ($SD = 0.79$). Hence, this cluster represents what Urada et al. (2007) called "out-group-like" others. The second cluster included 47.1% of observations with $M_{sim} = 5.1$ ($SD = 1.61$), representing the "in-group-like" others.

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[4] In the current analysis the default option of less than 25% of the biggest cluster is used.

The analysis on two randomly selected halves of the data revealed the same two-cluster solution with the same silhouette measure of 0.7 in both subsamples. ANOVA with cluster variable as a predictor and a measure of attitude as an outcome showed that 19% of the variance in attitude is explained by the cluster variable [$F(1, 4630) = 1096.4$, $p < 0.001$, $\eta_p^2 = 0.19$]. For comparison, the perceived similarity score itself explained 29% of the variance in attitude, which means that in our data 65% of the total explanatory power of perceived similarity was captured by the cluster variable.

Cluster "out-group-like"   Cluster "in-group-like"
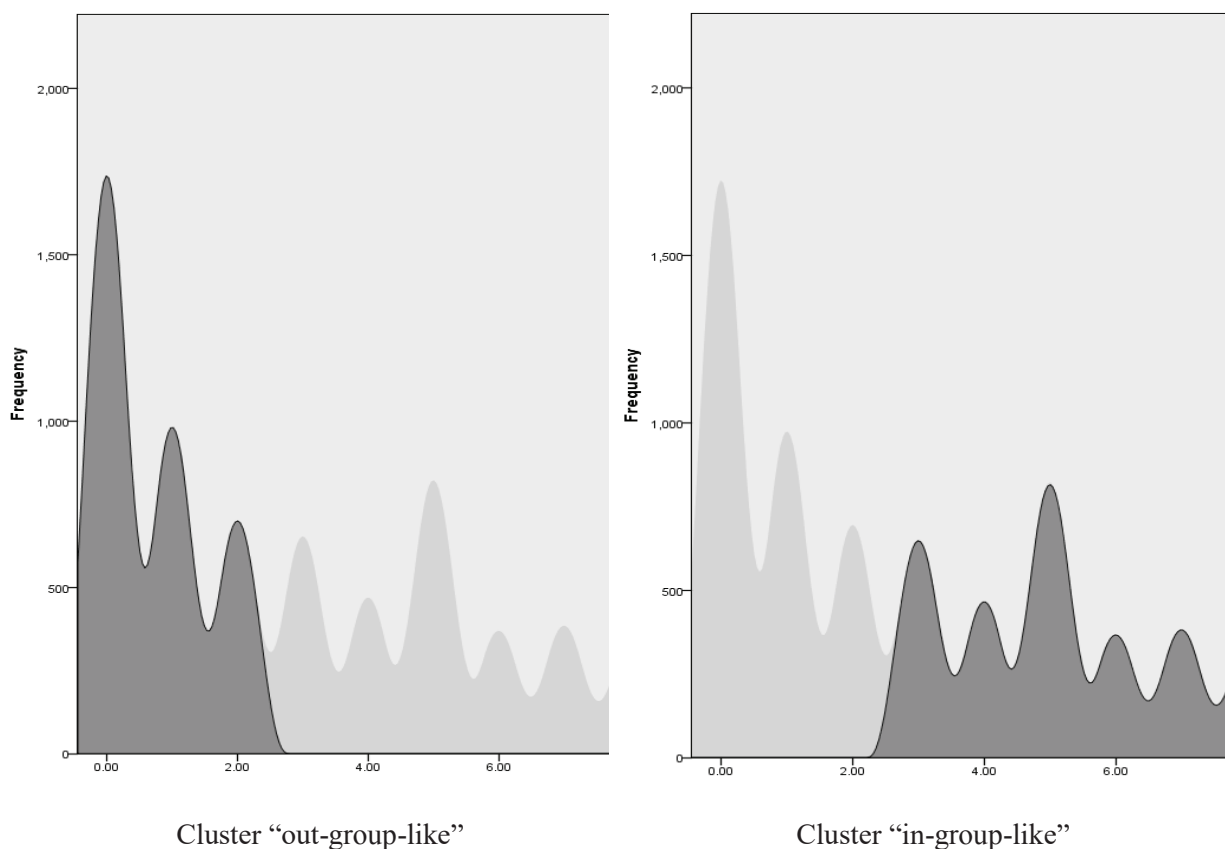
Figure 2.1. The two-cluster solution of the perceived similarity score distribution

Discussion

Humanity has always been extremely diverse. However, only now, with increasing globalization, migration, and social mobility it is becoming clear that studies of intergroup relations should focus more on how people make sense of their own and others' various crosscutting group memberships. The current study is a step towards understanding how

people form impressions of others who represent many social groups simultaneously (some of which might be viewed positively, and others negatively). Specifically, the purpose of this study was to investigate the role of perceived similarity in multiple categorization settings. Below I summarize the main findings of the study and discuss its theoretical and practical implications, as well as its limitations and possible directions for future research.

Theoretical implications

  Perceived similarity as a mediator. The current study both replicates and extends previous research on multiple categorization. There is overwhelming evidence suggesting that perceived similarity is the main mechanism linking shared group membership and attitudes both in simple categorization and crossed-categorization settings with two dimensions (Deschamps & Doise, 1978; Turner et al., 1987). However, the mechanism was never tested in more complex settings with multiple categorization dimensions. Our findings show that perceived similarity mediates the link between shared group membership (actual similarity) and attitude in these contexts as well. For each dimension, the effects of ingroup membership on attitude were mediated by perceived similarity. Moreover, for almost all dimensions studied, the mediation was full, i.e. there was no direct effect of ingroup membership on attitude once perceived similarity was taken into account. This suggests that perceived similarity is a powerful mechanism that explains intergroup bias not only in simple categorization but also in multiple categorization settings.

  Bottom-up vs. top-down information processing. Several studies suggest that when multiple group memberships are made salient, it becomes increasingly difficult to integrate this information in a meaningful way, so some categories might be ignored or a category-based judgment might be abandoned completely (Crisp, Hewstone, & Rubin, 2001; Hall & Crisp, 2005). Current findings show that participants were able to take into account all the information about targets, providing support for bottom-up processing of information. The

observed pattern can be best described by weighted averaging strategy, proposed by Anderson (1965). The weighted averaging strategy predicts the final impression not only from the number of positive or negative characteristics that are present (as the adding strategy does), but from the average positivity or negativity of all the characteristics, and the importance of each characteristic for the perceiver. The regression coefficients in our model can be interpreted as weighting coefficients in this model of impression formation.

Although these findings support the bottom-up approach to impression formation, we also found that the distribution of all similarity scores was bi-modal and formed two clusters, corresponding to what Urada and colleagues called "in-group-like" and "out-group-like" others (Urada & Miller, 2000; Urada et al., 2007). This pattern would suggest gestalt-based top-down processing of information, which seems to contradict the findings described above. However, I argue that there is no contradiction in these findings. Instead, they suggest that the two processes can operate jointly.

There have already been some attempts to integrate the two approaches to information processing. Both Brewer's dual process model of impression formation (Brewer, 1988) and Fiske and Neuberg's continuum model of impression formation (Fiske & Neuberg, 1990) integrate these two processing strategies into a single model. However, both models assume that the two strategies cannot operate simultaneously, and both specify the conditions under which either one or the other type of processing will be used. When discussing Brewer's model, Anderson (1988) notes that these two processes do not oppose each other and can operate jointly. The findings of the current study support Anderson's point of view: participants did take into account all the pieces of information that they were provided with, but their final impressions were generalized again into two meta-categories based on in-group-likeness. Based on these findings, we can argue that there is no inherent opposition between top-down and bottom-up, or category-based and individuated, or algebraic and

gestalt-based processing of information, but instead people can use both strategies simultaneously to form impressions about others.

Limitations and future directions

The question remains how generalizable these findings are. We aimed at representing the diversity of the society in our sample. The current sample included six different ethnic groups, people with and without Russian citizenship, with and without higher education, low-skilled workers and professionals, etc. Nevertheless, the sample was still dominated by highly educated professionals who have Russian citizenship and are fluent in Russian. Before any claims about the generalizability and universality of these mechanisms can be made, more studies with more balanced samples are needed. This field of research would also greatly benefit from comparative cross-cultural studies.

Another important limitation of this study is that the results apply only to no-interaction settings. When human interaction occurs in real life, many more factors can influence whether certain dimensions of social categorization are taken into account or not. In real-life settings, situational fit becomes highly important. Moreover, as we know from similarity-attraction studies (Montoya et al., 2008), objective similarity loses its predictive power once people get to know each other, so our results only describe the formation of the first impression from the available information about others' group memberships.

Some research questions that were beyond the scope of the current study deserve attention and could help to advance our understating of multiple categorization processes. First, the differences in perception of different outgroups on a single dimension of categorization can be investigated. Clearly, perceived similarity is a continuous variable, and simple dichotomies of in- and outgroups do not reflect the full range of perceptions of outgroups. For example, for a Russian person, a Ukrainian "other" will likely be perceived as more similar than an Azerbaijani "other", because Ukrainians are perceived as culturally

more similar due to shared pan-Slavic identity and common religion. Second, one could explore various interaction effects between participant characteristics and vignette dimensions, as well as between vignette dimensions themselves. For example, it is plausible that status-related characteristics, such as education level and language proficiency, are more important for the majority group members than for minorities. It is also plausible that status-related characteristics have different effects on perceived similarity and attitudes depending on whether the target is a minority or a majority group member, or male vs. female. These hypotheses are indeed intriguing and worth exploring in the future.

Practical implications

The most important practical implication of this study is that making any shared group membership between two people salient can make their attitudes towards each other more positive. The two most studied prejudice reduction interventions are intergroup contact and the common ingroup identity model. The contact hypothesis suggests that positive interaction between members of different social groups can reduce prejudice (Allport, 1954; Pettigrew & Tropp, 2006). The contact is most effective in reducing prejudice when certain conditions are met: (1) contact should be of sufficient frequency, duration and closeness; (2) it should have social and institutional support; (3) participants should have equal status; and (4) they should work towards a common goal. According to the common ingroup identity model (Gaertner, Dovidio, Anastasio, Bachman, & Rust, 1993), prejudice can be reduced by creating a superordinate identity that brings the former in- and outgroup members into a single group membership that they share.

Although both interventions received considerable empirical support, they are not without limitations. Implementation of any contact intervention might be challenging and requires a considerable amount of resources. To create an intervention that meets all of the criteria for a successful positive contact is even more difficult, if not impossible in some

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cases. The common ingroup identity model might be easier in implementation. However, this model relies on reducing intergroup differentiation, which might pose a threat to existing group identities (Brewer & Gaertner, 2003). Making multiple cross-cutting group memberships of people salient, on the other hand, is relatively easy and does not threaten any of the existing identities. It is difficult to imagine two people in the world who will have absolutely nothing in common. Making commonalities between people salient can be an easy way to reduce prejudice in any social setting. However, more experimental studies are necessary to assess the potential of this intervention as a tool to promote more harmonious relationships in societies.

CHAPTER 3

PATTERNS OF EVALUATION IN MULTIPLE CATEGORIZATION

Abstract

Crossed categorization studies usually use two categorization dimensions that "cut" across one another, often looking at artificial groups in a laboratory setting. The aim of this study is to test patterns of evaluation in crossed categorization scenarios with more than two dimensions. Using eight real-life categorization dimensions, we conduct a factorial survey experiment with a heterogeneous sample (N = 524). The results provide strong support for the additive pattern of crossed categorization, challenging the view that with increased number of categories category-based information processing will be abandoned. We find no evidence for any of the other patterns identified in crossed categorization studies. The study contributes to multiple and crossed categorization literature by testing some of its key assumptions using a design that increases ecological validity of the findings.

Social psychology of intergroup relations focuses on the in-group vs. out-group dichotomy, often leaving out the fact that there are always many possible in-groups and out-groups for each individual. Every single person with whom one interacts will be an in-group member on some dimensions, but an out-group member on others. Studies on multiple categorization clearly indicate that people are able and do use multiple bases for social categorization simultaneously (Crisp & Hewstone, 2007; Crisp, Hewstone, & Cairns, 2001).

Crossed categorization paradigm is one of the approaches to studying impression formation in multiple categorization scenarios. In this paradigm, two dimensions of social categorization intersect, allowing the exploration of patterns of evaluation that emerge (Deschamps & Doise, 1978). The paradigm has been successfully used to demonstrate that adding the second dimension of categorization reduces intergroup bias (Crisp et al., 2001; Migdal et al., 1998; Mullen et al., 2001). It has also allowed testing the patterns of evaluation that occur when two dimensions of categorization are simultaneously made salient (Crisp & Hewstone, 1999, 2007; Hewstone, Islam, & Judd, 1993).

Although crossed categorization is a case of multiple categorization, for the purposes of this paper we will refer to "crossed categorization" to indicate that different dimensions of categorization intersect, and to "multiple categorization" to indicate that more than two dimensions are used in a study. The aim of this study is to explore patterns of crossed categorization when multiple real-life group memberships that cut across one another are made salient, thereby combining crossed and multiple categorization approaches.

The motivation behind this study is to contribute to multiple and crossed categorization literature by focusing on ecological validity of this body of research. Nicolas, la Fuente, & Fiske (2017) point to three limitations of this literature. First, to the best of our knowledge, there are no studies so far that would explore crossed categorization effects with more than two groups. Multiple categorization studies that use more than two dimensions of

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categorization employ one of the two strategies: they either (1) combine a manipulation of a single categorization dimension with a manipulation of either all shared or all non-shared group memberships on other dimensions (Prati et al., 2016, 2015; Urada et al., 2007) or (2) generate mixed alternative group memberships, without manipulating them (Albarello & Rubini, 2012; Hall & Crisp, 2005). Nicolas et al. (2017) suggest that this can most likely be explained by methodological complexity associated with such attempts. Second, majority of crossed categorization research has been conducted using artificial groups in a laboratory setting (Ensari & Miller, 2001). And finally, samples used is previous studies have often been homogenous, usually including only the majority group members (Vescio, Judd, & Kwan, 2004).

The current study addresses these limitations in the following ways. First, we employ a factorial survey design (Rossi & Anderson, 1982), which allows manipulating multiple dimensions of categorization. On the one hand, it has the benefits of experimental designs, allowing to manipulate the dimensions of interest in the vignettes (higher internal validity), and, on the other hand, it has the benefits of survey designs, allowing to conduct a study outside of the laboratory setting (higher external validity) (Jasso, 2006b). Also, a factorial survey is less affected by social desirability compared to a conventional questionnaire (Armacost, Hosseini, Morris, & Rehbein, 1991). For research on intergroup perceptions and attitudes, all of these features of factorial survey design are of high significance, which can explain why more and more studies in this area are using this approach (C. Diehl, Andorfer, Khoudja, & Krause, 2013; Hainmueller & Hopkins, 2015; Havekes, Coenders, & van der Lippe, 2013; Schlueter, Ullrich, Glenz, & Schmidt, 2018). Second, we use real-life categories that are relevant for the given social context and conduct the study outside of the laboratory, which considerably improves external validity of the findings. And finally, we sample a heterogeneous group of participants from Russia, a country that has been underrepresented in

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psychological literature so far. We use quota sampling to reach participants from various

ethnic groups, with various religious affiliations, age, gender, and socio-economic status.

In the following section we first discuss the theoretical background of the study,

which is largely based on the assumptions of Social Identity Theory (Tajfel, 1978; Tajfel &

Turner, 1979) and Self-Categorization Theory (Turner, Hogg, Oakes, Reicher, & Wetherell,

1987), as well as findings from crossed categorization research. We then develop predictions

and propose an analytical strategy to test these predictions.

Theoretical Background

Social Identity Theory and Self-Categorization Theory

Two major theories that brought the processes of social categorization to the center of

intergroup relations studies are Social Identity Theory (SIT) and Self-Categorization Theory

(SCT). SIT is a comprehensive theoretical framework that deals with consequences of social

categorization for intergroup relations. The key assumption of the theory is that people have

a need for positive social identity, and this need is met by achieving positive distinctiveness

of their own group compared to other groups. The theory mainly addresses issues of status

differences between groups in a society and describes various strategies of dealing with

identity-related problems (Tajfel & Turner, 1979; Turner & Reynolds, 2001).

The evidence for the preference for in-groups vs. out-groups both in judgments and

behaviors is overwhelming (Hewstone et al., 2002; Wilder, 1986). However, the relationship

between in-group favoritism and out-group derogation is not straightforward (Brewer, 1999;

De Figueiredo & Elkins, 2003). Several moderators of this relationship have been identified

in the past research, such as strength of identification, threat, group size and status,

individual differences and others (Brewer, 1999; Mullen, Brown, & Smith, 1992; Turner &

Reynolds, 2001). As this relationship is out of the scope of this paper, we further use the

term *intergroup bias* to refer to differential assessment of the in-group members compared to out-group members.

SCT was developed as a complementary theory to SIT. It focuses on social categorization and group formation processes rather than intergroup bias and discrimination. The crucial aspect of SCT that is of relevance for the current study is that SCT focuses on category activation or salience and emphasizes that categorization is not simply an activation of a pre-existing cognitive structure, but rather a context-dependent process (Turner, Oakes, Haslam, & McGarty, 1994). Based on this theorizing, we argue that it is essential to explore and understand how certain categorization dimensions become more or less important for certain individuals in certain contexts.

Patterns of crossed categorization

Studies of crossed categorization were inspired by findings from the field of social anthropology showing that societies that have more cross-cutting group memberships have less internal tension (Gluckman, 1956; LeVine & Campbell, 1972). In the social psychological literature, crossed categorization refers to the combination of two dimensions of social categorization that result in four possible targets that can be evaluated: a double in-group, two targets with overlapping group memberships, and a double out-group (Deschamps & Doise, 1978). For example, if a respondent is German and male, then the four targets in a typical crossed categorization study could be German male (double in-group, II), German female (partial in-group, IO), French male (partial in-group, OI), and French female (double out-group, OO).

Experimental studies of crossed categorization effects in social psychology started with Deschamps & Doise (1978) category differentiation model. The idea behind this model is that while using one categorization dimension ("simple categorization") makes the intergroup differences and intragroup similarities salient (which eventually may result in

intergroup bias), crossed categorization reduces perceived intragroup similarity by dividing the in-group into two groups on the second dimension, and also reduces perceived intergroup differences by introducing part of the out-group members on one dimension as in-group members on the other. This mechanism, according to the authors, should reduce or even eliminate intergroup bias in crossed categorization conditions.

Several experimental studies found support for this argument. Usually studies report either elimination of intergroup bias in crossed categorization conditions, combined with negative assessment of the double out-group targets (M. Diehl, 1990) or, more often, reduction of bias in overlapping conditions, in a way that double in-groups are evaluated most positively, partial in-groups less positively, but not negatively, and finally the double out-groups are evaluated negatively (e.g., Brown & Turner, 1979; Vanbeselaere, 1987). This pattern is usually referred to as the *additive pattern* (e.g., Brewer, 1968; Hewstone et al., 1993).

Meta-analyses by Migdal, Hewstone, and Mullen (1998) and Urban and Miller (1998) found the additive pattern to be the fundamental crossed categorization effect. Urban and Miller (1998) reported that although the additive pattern is the baseline, there is significant variability of the patterns beyond it. This variation mainly emerges in those studies that use real-life social categories and can be explained by unequal psychological significance of categorization dimensions. The list of different patterns identified in the literature is presented in Fig. 3.1.

The category *dominance* pattern suggests that only the important categorization dimension will be regarded, and the second, subordinate dimension will be ignored (e.g., Brewer et al., 1987; Commins & Lockwood, 1978). The category conjunction pattern (Rogers, Miller, & Hennigan, 1981) has two variants: conjunction similarity, or social inclusion, and conjunction dissimilarity, or social exclusion. In the *social inclusion* pattern,

targets that share at least one group membership with the person are favored as much as the double in-group. In the *social exclusion* pattern, targets that are different from the person on at least one dimension are evaluated as negatively as the double out-group.

Conditions	Pattern	Dimension 1: In-group				Dimension 1: Out-group		
		Dimension 2: In-group		Dimension 2: Out-group		Dimension 2: In-group		Dimension 2: Out-group
Baseline	1. Additive	2		0		0		−2
		ii	>	io	=	oi	>	oo
Differential importance (here dimension 1 more important)	2. Dominance	1		1		−1		−1
		ii	=	io	>	oi	=	oo
Positive affect/in-group prime	3. Social inclusion	1		1		1		−3
		ii	=	io	=	oi	>	oo
Negative affect/out-group prime	4. Social exclusion	3		−1		−1		−1
		ii	>	io	=	oi	=	oo
Positive affect/differential importance (here dimension 1 more important)	5. Hierarchical acceptance	4		0		−2		−2
		ii	>	io	>	oi	=	oo
Negative affect/differential importance (here dimension 1 more important)	6. Hierarchical rejection	2		2		0		−4
		ii	=	io	>	oi	>	oo
Extreme positive affect/low importance groups/absence of salience categorizations	7. Equivalence	ii	=	io	=	oi	=	oo

Note: i, in-group constituent of group; o, out-group constituent of group. Differences in sign (+/−) specify where differences are to be expected across the four crossed category subgroups. No contrast weights can be shown for the equivalence pattern because it is a null effect.

Figure 3.1. Patterns of crossed categorization (adopted from Crisp & Hewstone, 2007)

The hierarchical ordering pattern suggests that the use of the second category will depend on whether the target person was categorized as an in-group or an out-group member on the first dimension (the "first" here refers to the category that is deemed more important). In the *hierarchical acceptance* pattern, only those targets that were classified as an in-group member on the first, important dimension will be further differentiated based on the second dimension; those classified as out-group members on the important dimension will not be further differentiated based on the second dimension (Brewer et al., 1987; Park & Rothbart, 1982). In the *hierarchical rejection* pattern, the differentiation on the second, less important dimension, will be present only for the targets classified as an out-group member on the first

dimension (Hewstone et al., 1993). Finally, there is also a possibility that no differentiation occurs on any of the dimensions: the *equivalence pattern*.

All these patterns were proposed and tested only with two dimensions of categorization. Multiple categorization studies mainly focus on the bias reduction potential of multiple categorization (Hall & Crisp, 2005; Prati et al., 2016, 2015). The only study so far that investigated the patterns of crossed categorization when multiple categories are used is the study by Urada and colleagues (2007). The authors argue and provide evidence for qualitatively different way of data processing in the multiple categorization setting compared to traditional two-group designs. They show that the perception of targets is heuristic rather than additive and that there is a certain threshold that separates targets that are being perceived as more in-grouplike vs. more out-grouplike. These findings are in line with feature detection strategy of data processing (Prinz & Scheerer-Neumann, 1974), which suggests that when individuals are presented with complex stimuli, they tend to evaluate it as a Gestalt, rather than as a combination of specific characteristics that add up to each other to form an impression. This study, however, has the same limitation as the other multiple categorization studies: the design does not allow crossing multiple group memberships, and the effects are tested only for the cases when either multiple in-group or multiple out-group memberships are added to the primary dimension.

In the differentiation-decategorization model of multiple categorization effects, Crisp & Hewstone (2007) propose that when the number of cross-cutting dimensions increases, the complexity of cognitive task increases as well, and decategorization occurs. This argument is in line with Brewer's (1988) dual process model of impression formation, which suggests that when the target does not easily fit into one of the pre-existing categories, the impression will not be category-based, but rather individuated. These earlier theories could not be easily applied to multiple categorization settings with cross-cutting group memberships because of

methodological difficulties associated with the high number of comparisons that such design would require. Based on the existing findings on patterns of crossed categorization with two groups, we developed predictions for patterns of evaluation that can occur in multiple crossed categorization settings. Table 3.1 summarizes these predictions.

Table 3.1. Predicted patterns of multiple crossed categorization

Pattern	Prediction
Additive	There is a positive linear relationship between the number of shared group memberships and the attitude.
Dominance	Once observations are divided into in- and out-group members on the dominant dimension, the number of shared group memberships has no effect on the attitude within the subsamples.
Social inclusion / Conjunction similarity	(1) Targets with no shared group memberships (subsample 1) are evaluated more negatively than targets with any number of shared group memberships (subsample 2), AND (2) There is no relationship between the number of shared group memberships and the attitude in subsample 2.
Social exclusion / Conjunction dissimilarity	(1) Targets with shared group membership on all dimensions (subsample 1) are evaluated more positively than targets with any number of non-shared group memberships (subsample 2), AND (2) There is no relationship between the number of shared group memberships and the attitude in subsample 2.
Hierarchical acceptance	There is a positive linear relationship between the number of shared group memberships and the attitude in the subsample of in-group members on the dominant dimension, but not in the subsample of out-group members on the dominant dimension.
Hierarchical rejection	There is a positive linear relationship between the number of shared group memberships and the attitude in the subsample of out-group members on the dominant dimension, but not in the subsample of in-group members on the dominant dimension.
Equivalence	The number of shared group memberships has no effect on the attitude

The present study

This study goes beyond the traditional two-group model of crossed-categorization studies. We use multiple dimensions of social categorization that are relevant in a given social context and test the patterns of crossed categorization in multiple categorization settings. This is the first study to investigate patterns of crossed categorization in multiple crossed categorization settings.

The study is conducted in Russia, a culturally diverse country that is home to over 180 ethnic groups and a large number of immigrants coming mainly from former USSR countries (Russian Census, 2010). This diversity coincides with high levels of ethnic intolerance (Grigoryan, 2016), gender (Mezentseva, 2005) and income (Treisman, 2012) inequality, which makes this context uniquely fit for a study on multiple crossed categorization.

We employ a sequential mixed methods design. First, we conducted expert interviews to determine which dimensions are most relevant in the given social context. These resulted in a set of eight dimensions that we then used in a factorial survey experiment to test the proposed hypotheses: ethnicity, religion, gender, age, education, proficiency in Russian language, job skill level, and immigration status. We sample a diverse group of people from the general population in a way that all group memberships that are used in target stimuli are also represented in the sample of participants.

<div align="center">

Method[5]

</div>

Participants

We sampled representatives of six ethnocultural groups living in Russia, including Russians as a majority group, Tatars and Bashkirs as indigenous ethnic minorities, and Ukrainians, Armenians, and Azerbaijanis as minority groups with different statuses and

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[5] Chapter 2 and Chapter 3 are based on the same study, hence the method sections of the two chapters overlap. However, we report methods in each chapter for coherence and readability.

different degrees of cultural distance from Russians. These six groups also represent two major religions in Russia: Christianity (Russians, Ukrainians, Armenians) and Islam (Tatars, Bashkirs, and Azerbaijanis). The sample included people with and without higher education degree, low skilled workers and skilled professionals, people with and without immigration background, etc. The data was collected online. The link to the online survey was distributed via social networks, such as Facebook and VKontakte (Russian analogue of Facebook), as well as online forums of ethnic diasporas. The characteristics of the sample are presented in Table 3.2.

In total, 735 people accessed the questionnaire. We excluded 194 participants who had missing values on all key variables. Another 15 participants were excluded as they reported to be less than 18 years old. Finally, two participants were excluded due to technical errors in data recording[1]. The final sample includes 524 participants.

Table 3.2. Sample characteristics

Ethnic group	N	% Female	Age M (SD)	Religion (%)			% Russian citizens	% with tertiary education	% native Russian speaker	% professional
				None	Christian	Muslim				
Russian	216	74.1	27.8 (7.9)	25.5	67.1	1.4	97.7	96.8	98.6	92.1
Tatar	57	66.7	27 (5.5)	21.1	5.3	71.9	98.3	91.3	66.7	94.7
Ukrainian	37	48.6	31.2 (10.9)	16.2	81.1	0	45.9	81.1	83.8	83.8
Bashkir	95	57.9	31.1 (10.2)	14.7	1.1	80	97.9	85.3	25.3	84.2
Armenian	74	52.7	34.2 (12.3)	13.5	82.4	1.4	95.9	89.2	55.4	87.8
Azerbaijani	45	44.4	22.4 (5)	6.7	0	91.1	75.6	86.6	53.3	88.9
Total	524	63	29 (9.4)	19.1	45.8	30.9	92	91.1	70.8	89.5

Note. M = Mean, SD = Standard deviation.

Design and procedure

The two-step research design included expert interviews aimed to identify the most relevant dimensions of social categorization in the given cultural context, and a factorial survey, which allowed the manipulation of these social categories and testing of the causal effects of the dimensions on attitudes.

Expert interviews. In the first stage, eight experts in intergroup relations (social psychologists, sociologists, anthropologists) were interviewed. In a semi-structured interview experts were first asked to rate the importance of different dimensions of social categorization in the Russian context from a pre-selected list of dimensions, and then to add other relevant dimensions that were not mentioned. The results were analyzed by calculating the means on importance of the pre-selected dimensions and by employing quantitative content analysis to the open-ended question. As a result, we obtained a set of characteristics that were particularly relevant for intergroup relations in the Russian context. The list of these characteristics (dimensions of social categorization) and respective categories are presented in Table 2.1 of Chapter 2. A more detailed report of the results of expert interviews can be found in SM – Study 1.

Factorial survey. In the second stage, six ethnic groups were surveyed using factorial survey design. Factorial survey design (Rossi & Anderson, 1982) is an experimental technique within survey methodology. This technique is similar to the factorial design in experimental studies, where several independent variables (factors) are manipulated, to test their effects on a single dependent variable. In a factorial survey, similar to factorial experiment, each factor has a number of levels and the combination of different levels for different dimensions produces a variety of cases that can be presented to participants in a form of a scenario or a vignette.

In this study, dimensions of social categorizations represent factors or vignette dimensions, respective social categories represent levels of these dimensions, and evaluation of a vignette person is the dependent variable. Each vignette describes a person with a specific set of group memberships, followed by questions about this vignette person.

Given the number of dimensions and levels presented in Table 2.1, the vignette universe (all possible combinations of levels of different dimensions) contains 8748 cases (6x3x2x3x3x3x3x3). The following implausible combinations were excluded before sampling the vignettes: (1) No higher education + Highly skilled specialist; (2) Was born in Russia + Almost does not speak Russian; (3) Russian + Almost does not speak Russian or Speaks Russian, but not well. In addition, we excluded the vignettes that featured a person who belongs to one of the ethnic groups that are indigenous to Russia (Russians, Tatars, or Bashkirs) and has an immigration background. This decision was made after the pretest when many participants from these ethnic groups negatively reacted to the vignettes where a vignette person that featured a member of their ethnic group was described as an immigrant.

After excluding these implausible combinations, we sampled 100 vignettes from the vignette universe, using a D-efficient fractionalized design. The D-efficiency coefficient is a measure of goodness of the design that takes into account orthogonality and balanced representation of vignette dimensions. This coefficient varies from 0 to 100, where the maximum value of 100 is reached with an absolutely balanced and orthogonal design. A computer algorithm searches for the best solution that will provide maximum orthogonality and balance in the set of sampled vignettes (Duelmer, 2007). The sample of 100 vignettes in this study reached a D-efficiency coefficient of 89.8, with an average prediction standard error of 0.44.

After sampling the vignettes, we assigned these 100 vignettes to ten different sets (versions of the questionnaire) that were then randomly assigned to the respondents. The

sampling of the vignettes and assignment to sets was done using SAS Enterprise software (SAS Institute Inc., Cary, 2011). The ten versions of the questionnaire contained the exact same materials with the exception of the varying vignette sets. No vignette was repeated in two different versions of the questionnaire and only one level of each factor was presented in a single vignette. The distribution of factor levels by vignette sets is presented in Table S1.1 of the Supplement. The order of presentation of vignettes was randomized for every respondent. Data was collected through the online survey platform Qualtrics (Qualtrics, 2005).

Procedure. The questionnaire started with an informed consent form. APA ethical guidelines were followed in data collection, analysis, and reporting. Only participants who agreed to participate were given access to the main part of the questionnaire. This part started with items measuring socio-demographic variables, followed by ten vignettes. This is an example of a vignette from one of the questionnaires: "Svetlana: 25 years old, Russian, Muslim. She was born in Russia and speaks Russian fluently. Doesn't have higher education. She is a skilled professional". After each vignette, participants were asked three questions, one assessing perceived similarity to the person described in the vignette, and two assessing attitude towards the person. In the current study we only use the measures for the attitude towards a vignette person (see Chapter 2 for the results on perceived similarity). At the end of the questionnaire a more detailed description of the study was given, together with the contact details of the researcher.

Measures

Attitude. Two items were used to measure attitude towards the vignette person: one is a modified question from Bogardus' social distance scale (Bogardus, 1933; Parrillo & Donoghue, 2005): "Would you like this person to be your neighbor?" and the other is a

general attitudinal question: "Do you like this person?" Both items had an 11-point response scale, from 0 (not at all) to 10 (very much), and correlated at $r = .85$, p < .001.

Socio-demographic variables. We asked about ethnicity, religion, age, gender, education, occupation, knowledge of Russian language, and immigration status of the respondents to be able to later identify whether or not they shared a certain group membership with the vignette persons.

Gender. "Please specify your gender", with response options "Male" and "Female".

Age. "Please specify your age", open-ended question.

Occupation. "What is your occupation", open-ended question.

Ethnicity. "Please specify your ethnic group", with six response options corresponding to the groups that we sampled: Russian, Tatar, Ukrainian, Bashkir, Armenian, Azerbaijani.

Education. "Please specify your level of education", with response options from 1 – "Incomplete secondary education" to 6 – "Doctor of Sciences".

Religion. "Please specify your religious affiliation", with response options "I do not associate with any religion", "Christian", "Muslim", and "Other religion".

Citizenship. "Are you a citizen of Russia", with response options "Yes" and "No (please specify your citizenship)".

Language proficiency. "Is Russian your mother tongue?" with response options "Yes" and "Not". If the respondent answered "No", then they were redirected to another question: "How would you evaluate your proficiency in Russian language?" with response options "I'm fluent in Russian", "I have a relatively good knowledge of Russian", and "I have a quite poor knowledge of Russian".

Before proceeding to data analysis, we created a set of variables that indicated whether the participant and the vignette person shared a group membership on each of the

dimensions. The details of the coding scheme are provided in Table S1.2 of SM. All study

materials, including data and syntax, are available on the Open Science Framework platform:

https://osf.io/dfqpa/?view_only=a1b4fe7092f84e74a22fd61f7c6995a6.

Results

To analyze factorial survey data, the hierarchical structure of the data should be taken

into account (Duelmer, 2007; Hox, 2002). Responses to vignettes are nested in respondents.

As each respondent evaluated multiple vignettes, the final dataset included 5036 observations

(524x10 = 5240 observations, minus 204 missing values, as not all respondents reacted to all

ten vignettes). The intra-class correlation was 0.45, so differences between respondents

accounted for 45% of variance of the dependent variable. As we are interested in the

interaction between a respondent characteristic (identity importance) and a vignette

characteristic (group membership of the vignette person) in predicting the outcome (attitude),

we use multilevel regression analysis, where we treat individuals as second level units in the

multilevel model (similar strategy is employed in Havekes et al., 2013 and Schlueter et al.,

2018).

We first identify the dominant dimension of categorization by looking at the effects of

shared group membership on each dimension in predicting the attitude when controlling for

the main effects of vignette dimensions and respondents' group memberships. The dimension

that will have the strongest effect on the attitude will be treated as the dominant one when

testing the patterns of crossed categorization. We then proceed to test these patterns. Finally,

we test cross-level interactions between the importance of categorization dimension as

reported by the respondent and the group membership of the vignette person on the respective

dimension. A significant positive interaction would provide supporting evidence for the

proposed hypothesis, that is, the intergroup bias is stronger when a dimension is deemed

important.

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Identifying the dominant category

To identity which dimension of categorization produced most bias, we first include the vignette dimensions in the model (Model 1), then add the respondents' characteristics (Model 2), and in the final step, add the variables reflecting whether or not the respondent and the vignette person shared a group membership on each of the dimensions (Model 3). As the model includes a large number of predictors, to reduce Type-I error, we use $p < .001$ as a cutoff value, instead of the conventional value of $p < .05$ in all further analyses. Considering that the sample includes over 5000 observations, this should not result in any considerable loss of power. The results of this analysis are presented in Table 3.3.

The vignette dimensions explained approximately 17% of the variance in attitudes on the vignette level. At the same time, they increased the unexplained variance on the respondent level by 2.3%. The strongest predictors of the attitude were the dimensions reflecting the socio-economic status of the vignette person: job skill level, language proficiency, education level, and immigration background. The inclusion of respondents' characteristics to the model explained 7.9% of the variance on the respondent level, and 1.2% of the variance on the vignette level. Among the respondents' characteristics, Russian citizenship had the strongest effect: citizens evaluated the vignette persons in general more negatively than non-citizens ($b = -1.46$, $SE = .40$, $p < .001$). Finally, the inclusion of the shared group membership on each dimension added another 5.2% to the explained variance on the vignette level, but did not contribute to the explained variance on the respondent level.

Table 3.3. Linear mixed effects models predicting attitude towards the vignette person

	Model 1			Model 2			Model 3		
	b	*S.E.*	*p*	*b*	*S.E.*	*p*	*b*	*S.E.*	*p*
Intercept				6.96	.15	<.001	6.92	1.13	<.001	5.55	1.16	<.001

Vignette dimensions

	Model 1			Model 2			Model 3		
	b	S.E.	p	b	S.E.	p	b	S.E.	p
Ethnicity: Azerbaijani	−.31	.13	.018	−.33	.13	.013	−.07	.13	.581
Ethnicity: Tatar	−.05	.13	.709	−.10	.13	.464	.11	.13	.424
Ethnicity: Bashkir	.04	.13	.732	.03	.13	.841	.21	.13	.107
Ethnicity: Ukrainian	−.15	.13	.257	−.17	.13	.204	.10	.13	.447
Ethnicity: Armenian	−.23	.13	.085	−.25	.13	.060	−.04	.13	.764
Ethnicity: Russian	*Reference*								
Religion: Not religious	−.35	.07	<.001	−.34	.08	<.001	−.12	.07	.084
Religion: Muslim	−.13	.07	.074	−.15	.07	.029	−.02	.07	.791
Religion: Christian	*Reference*								
Gender: Male	−.17	.06	.003	−.20	.06	.001	−.18	.06	.002
Gender: Female	*Reference*								
Age: 25 years old	−.09	.07	.200	−.10	.07	.165	−.35	.10	<.001
Age: 45 years old	−.09	.07	.180	−.11	.07	.125	−.13	.07	.072
Age: 65 years old	*Reference*								
Education: No higher education	−.83	.08	<.001	−.81	.08	<.001	−.67	.12	<.001
Education: Higher education	−.16	.07	.015	.15	.07	.029	−.15	.07	.026
Education: PhD	*Reference*								
Language: Almost doesn't speak Russian	−.95	.09	<.001	−.96	.09	<.001	−.79	.22	<.001
Language: Speaks Russian, but not well	−.37	.07	<.001	−.34	.07	<.001	−.14	.21	.502
Language: Speaks Russian fluently	*Reference*								
Job skill level: Low-skilled worker	−1.04	.08	<.001	−1.08	.08	<.001	−.84	.12	<.001
Job skill level: Skilled professional	−.16	.08	.036	−.19	.08	.016	−.19	.08	.015
Job skill level: Highly skilled specialist	*Reference*								
Immigration status: Immigrated illegally	−.66	.10	<.001	−.61	.10	<.001	−.49	.15	.001
Immigration status: Immigrated legally	−.08	.10	.390	−.07	.10	.441	.04	.14	.788
Immigration status: Born in Russia	*Reference*								
Respondent characteristics									
Ethnicity: Azerbaijani				.11	.52	.828	.05	.52	.930
Ethnicity: Tatar				.46	.43	.282	.45	.43	.291
Ethnicity: Bashkir				.007	.44	.988	−.08	.44	.847

	Model 1			Model 2			Model 3		
	b	S.E.	p	b	S.E.	p	b	S.E.	p
Ethnicity: Ukrainian				.89	.45	.008	.89	.45	.048
Ethnicity: Armenian				−.51	.31	.105	−.61	.31	.054
Ethnicity: Russian	*Reference*								
Religion: Christian				−.06	.27	.832	−.04	.27	.885
Religion: Muslim				−.80	.37	.031	−.82	.37	.028
Religion: Other				−.28	.51	.584	−.02	.51	.966
Religion: Not religious	*Reference*								
Gender: Male				−.40	.20	.045	−.39	.20	.053
Gender: Female	*Reference*								
Age				.01	.01	.150	.04.1	.01	.142
Education level				.02	.18	.925	−.01	.18	.957
Language proficiency				.35	.21	.104	.36	.21	.096
Job skill level: Low				−.67	.35	.055	−.58	.35	.098
Job skill level: High	*Reference*								
Citizenship: Russian				−1.46	.40	<.001	−1.5	.41	<.001
Citizenship: Non−Russian	*Reference*								

Shared group membership on the dimension

	Model 1			Model 2			Model 3		
Ethnicity							.74	.09	<.001
Religion							.78	.06	<.001
Gender							.03	.06	.617
Age							.30	.09	<001
Education level							.19	.11	.104
Language proficiency							.18	.21	.379
Job skill level							.30	.11	.005
Immigration status							.13	.12	.299

Variance components

	Model 1			Model 2			Model 3		
Residual variance (vignette level)	4.16[*]	.09	<.001	4.11	.09	<.001	3.90	.08	<.001
Intercept variance (individual level)	4.18[*]	.29	<.001	3.85	.27	<.001	3.85	.27	<.001

Explained variance

	Model 1	Model 2	Model 3
Vignette level	16.8%	1.2%	5.2%
Individual level	−2.3%	7.9%	0%

Note. * Model 1 is compared to the empty model (variance on vignette level = 4.998,

$SE = .10$, $p < .001$; variance on individual level = 4.084, $SE = .29$, $p < .001$)

The direction of the effects for shared group membership was consistent with expectations: the in-group members on all dimensions were evaluated more positively than the out-group members, although the effects were not always significant. As shared group membership is measured by dummy variables (in-group vs. out-group) for all dimensions, the sizes of fixed effect estimates can be directly compared. The strongest predictor was religion ($b = .78$, $SE = .06$, $p < .001$) and the second strongest was ethnicity ($b = .74$, $SE = .09$, $p < .001$). We additionally calculated pseudo R^2 for the unique variance explained by each of these two dimensions. Shared group membership on the dimension of religion alone explained 3.2% of the variance in attitude, whereas shared ethnicity explained only 1.6% of the variance. Thereby we treat religion as the dominant categorization dimension in the following analyses.

Patterns of crossed categorization

Additive pattern. As we proposed in the introduction, a positive linear relationship between the number of shared group memberships and the attitude can be considered supporting evidence for additive pattern of crossed categorization in multiple categorization setting. To test this prediction, we calculated an index that is a sum of all shared group memberships between the participant and the target (each shared group membership has a score of 1). We will further refer to this index as N_{shared}. The index varied from 0 (no shared group memberships) to 8 (all group memberships are shared). However, there were only two observations in the latter group. To achieve more robust estimates, we transformed this variable into a 7-point scale, combining the group that shared seven and eight group memberships with the target. Fig. 3.2 presents a bar chart that shows the linearity of the relationship between the number of shared group memberships and the attitude.
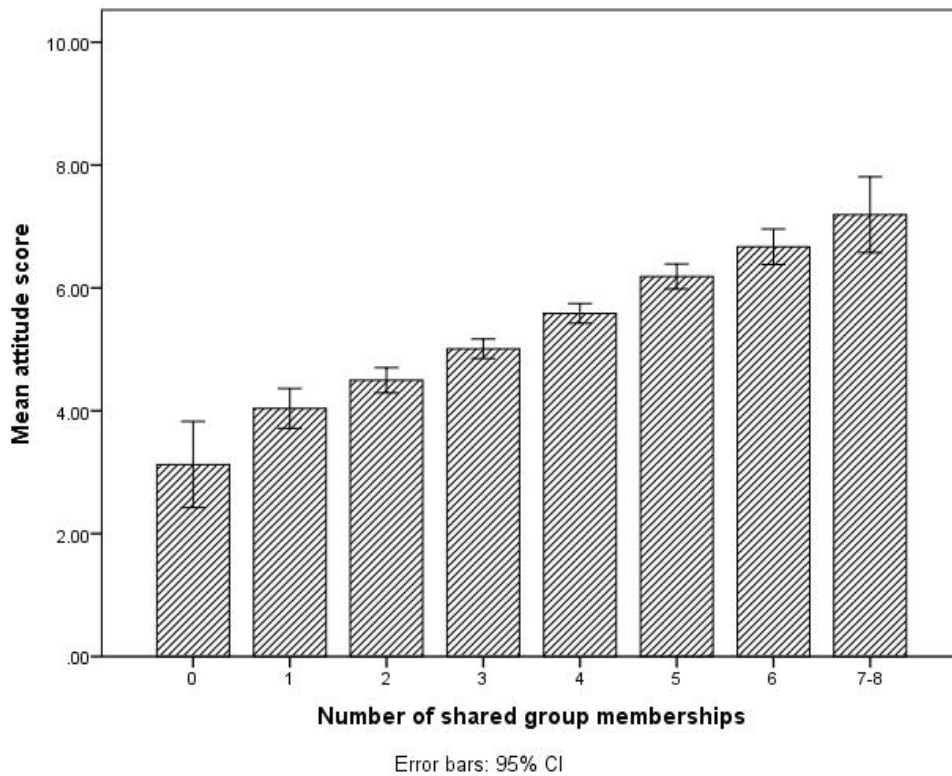
Figure 3.2. The linear relationship between the number of shared group memberships with the target, and attitude towards the target.

We further tested the strength and statistical significance of this relationship in a mixed model. The inclusion of N_{shared} as the only predictor of the attitude resulted in a significant positive effect ($b = .55$, $SE = .02$, *95% CI* [.51, .59], $p < .001$) and reduction in unexplained variance of 14.4%[2]. To make sure that the effect is linear, we included a quadratic term of N_{shared} to the model. A significant effect of the quadratic term would indicate non-linearity in the relationship (Gåsdal, 2013). The quadratic term of N_{shared} had no effect on the dependent variable ($b = 3.04E{-}5$, $SE = .01$, *95% CI* [−.02, .02], $p = .998$), whereas the linear relationship remained significant ($b = .55$, $SE = .09$, *95% CI* [.38, .73], $p < .001$). Finally, the effect of N_{shared} remained significant ($b = .37$, $SE = .03$, *95% CI* [.31, .44], $p < .001$) when controlling for vignette dimensions and respondent characteristics. The unique variance explained by N_{shared} after including the control variables was 3.2%. These results provide strong support for the additive pattern of crossed categorization.

Dominance, hierarchical acceptance, hierarchical rejection. All these patterns of crossed categorization have one thing in common: their predictions are based on unequal importance of categorization dimensions. As we determined in the first stage of the analysis, religion was the dominant categorization dimension in the current sample. The prediction derived from the dominance pattern is that once the sample is divided into in- and out-group members on the dominant dimension, N_{shared} should have no effect on the attitude in any of the subsamples. The prediction of hierarchical acceptance pattern is that there is a positive relationship between N_{shared} and the attitude in the subsample of in-group members on the dominant dimension, but not in the subsample of out-group members on the dominant dimension. Finally, hierarchical rejection predicts absence of the relationship in the subsample of in-groups and a positive relationship in the subsample of out-groups.

To test these predictions, we divided the sample into in- and out-group members on the dimension of religion, which resulted in two subsamples with $N_{in} = 1604$ and $N_{out} = 3432$. Counter to the expectation, the effect of N_{shared} was significant in both subgroups. The effects were about the same strength in both groups (among religious in-groups: $b = .54$, $SE = .04$, *95% CI* [.47, .62], $p < .001$; among religious out-groups: $b = .54$, $SE = .02$, *95% CI* [.49, .59], $p < .001$), with 15.5% of variance explained in the subsample of religious in-groups and 13.8% of variance explained in the subsample of religious out-groups. Thus, we found no support for the dominance, hierarchical acceptance, and hierarchical rejection patterns.

Conjunction similarity and conjunction dissimilarity. Conjunction patterns predict that (not) sharing group membership on one dimension can determine the attitude towards the target. *Conjunction similarity* predicts that targets with no shared group memberships will be evaluated more negatively than targets with any number of shared group memberships, and that there will be no relationship between N_{shared} and the attitude in the second group. In contrast, *conjunction dissimilarity* predicts more positive evaluations for the targets that share

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group membership on all dimensions compared to the rest, and the absence of the relationship between N_{shared} and the attitude in the group that share some number of group memberships, but not all.

As mentioned before, we had only two observations in the sample where the participant and the target shared all eight group memberships. This made it impossible to test the conjunction dissimilarity pattern. The number of observations where the participant and the target did not share any group memberships was 48, so we could test the conjunction similarity pattern. In line with the expectations of this pattern, targets that did not share any group memberships with the participant were evaluated more negatively than the rest ($b =$ 1.88, $SE = .33$, 95% CI [1.22, 2.54], $p < .001$). However, the link between N_{shared} and the attitude in the rest of the sample remained strong ($b = .56$, $SE = .02$, 95% CI [.52, .60], p $<.001$). This leads us to conclusion that conjunction similarity pattern was not supported. Although we could not formally test the conjunction dissimilarity model, the variation in attitude across the groups that share from 0 to 6 group memberships (Fig. 3.2) suggests that this pattern could not be supported as well.

Discussion

The motivation behind this study was to contribute to multiple crossed categorization research by focusing on its ecological validity. To achieve this goal, we conducted a factorial survey experiment which allowed us to cross eight dimensions of categorization. We selected categories that were relevant for the given social context based on expert interviews. Finally, we sampled representatives from all social groups that were used in the vignettes, including several ethnic and religious minorities. Conducting the study online allowed us to get a relatively large sample, which makes the study better-powered than majority of crossed categorization studies conducted in laboratory setting with small samples.

Our results provide strong evidence for the additive pattern of crossed categorization. The number of shared group memberships had a strong effect on the attitude. This effect remained significant after controlling for respondents' characteristics and the effects of the vignette dimensions. Previous studies suggested that when the number or the complexity of dimensions increases, people are most likely to abandon category-based processing (Crisp & Hewstone, 2007). Urada et al. (2007) proposed that with increasing number of categorization dimensions, people switch to non-algebraic strategies of information processing, that is, the targets are perceived as either in-group-like or out-group-like without further differentiation. However, none of the earlier studies investigated patterns of multiple crossed categorization with a fixed number of dimensions and a systematic variation of in- and out-group memberships on each dimension. This finding challenges the view that people are not able to use algebraic strategies of information processing with high numbers of categories to consider.

We found no support for any other pattern of categorization. Dimensions indeed differed in the strength of bias that they produced, with religion and ethnicity being the strongest predictors of the attitude. However, when splitting the sample of observations into in- and out-group members on the dominant dimension of religion, we still found a strong additive pattern within each of the two sub-samples, contradicting predictions of dominance and hierarchical ordering patterns. The same was true for conjunction patterns: there were significant differences in evaluations of targets with mixed group memberships that could be explained by the number of shared group memberships.

There are some limitations to this study that might serve as starting points for future research. First, the sample of the current study is a convenient online sample, which does not allow making generalizations to the whole population of the country. Additionally, subsamples differed in size, which could have affected the strength and significance of

effects. By controlling for respondents' group memberships on all relevant dimensions, we minimized the possibility of bias. However, future studies would greatly benefit if quota or stratified probability samples are used.

These results highlight another important limitation of multiple categorization research. The current study, as well as earlier research on multiple categorization clearly indicate that when real-life social categories are used, some categories show stronger effect on attitudes than others. In our case, of all eight dimensions studied, religion produced the strongest intergroup bias. The determinants of the strength of intergroup bias in multiple categorization settings received very little attention in prior research. As multiple categorization provides a better approximation of real-life interactions, addressing the question of what determines the strength of intergroup bias in multiple categorization settings would be a significant contribution to the psychology of intergroup relations.

CHAPTER 4

EXPLAINING STRENGTH OF BIAS ON THE INDIVIDUAL LEVEL

Abstract

Research on intergroup bias usually focuses on a single dimension of social categorization. In real life, however, people are aware of others' multiple group memberships and use this information to form attitudes about them. The present study compares the predictive power of identification, conflict, and threat, in explaining strength of intergroup bias on various dimensions of social categorization in multiple categorization settings. We conduct a factorial experiment, manipulating nine dimensions of social categorization in diverse samples from four countries (N = 12810 observations, 1281 respondents representing 103 social groups). This approach allows exploring the generalizability of three established determinants of bias across dimensions of categorization, contexts, and target groups. Our findings suggest that Social Identity Theory offers the most generalizable explanation for the strength of intergroup bias on the individual level, predicting bias across dimensions and contexts. Perceptions of intergroup conflict have limited explanatory power, although evidence suggests that conflict might have a greater explanatory power at the group level. We provide strong evidence in support of predictive power of symbolic threat across categorization dimensions. However, our findings also suggest a boundary condition for this effect: threat is related to more negative outgroup attitudes only when the target is a minority or a lower-status group member.

Intergroup bias, the preference of ingroup members over outgroup members, is one of the most studied phenomena in social psychology. This preference has been documented in attitudes, emotions, and behavior across dimensions of social categorization and contexts (Hewstone et al., 2002). Three prominent theories explain intergroup bias. The realistic group conflict theory (RGCT; Campbell, 1965; Sherif, Harvey, White, Hood, & Sherif, 1961) proposes that intergroup bias is based on conflicting interests of the involved parties, such as competition for resources. Social identity theory (SIT, Tajfel & Turner, 1979) attributes bias to basic cognitive process of social categorization: membership groups become part of an individual's self-concept, and bias results from motivation to see these groups in a positive light, compared to outgroups. Finally, the Integrated Threat Theory (ITT, Stephan & Stephan, 1996) explains bias through perceived threat from outgroups.

All these theories have been successfully used to explain bias on various dimensions of social categorization, such as ethnicity, religion, gender, etc. (Bettencourt et al., 2001; Esses et al., 2005; Riek et al., 2006). However, the studies of bias usually focus on a single dimension of social categorization, whereas in reality people are usually aware of others' multiple group memberships. Research on crossed and multiple categorization suggests that people simultaneously use multiple bases of categorization when forming impressions about others (Crisp & Hewstone, 2007; Crisp, Hewstone, & Cairns, 2001). These studies also find that when real social categories are used, some categories produce stronger intergroup bias than others (Brewer et al., 1987; Hewstone et al., 1993; Urban & Miller, 1998).

Scholars across disciplinary boundaries emphasize the importance of considering the multiplicity of group memberships in the study of prejudice (Cole, 2009; Crisp & Hewstone, 2007; Vertovec, 2007). Nevertheless, the question whether existing theories of intergroup relations can explain the strength of intergroup bias in multiple categorization settings remains unaddressed. This study aims to attend to this gap by comparing the predictive power

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of three established determinants of intergroup bias — identification, salience of conflict, and symbolic threat —in explaining strength of intergroup bias in multiple categorization settings.

Identification

SIT posits that through identification, social groups to which we belong become part of our self-concept. As we are motivated to see ourselves positively, we are also motivated to see these membership groups positively, which can be achieved through intergroup comparison. This is the basic cognitive process that, according to SIT, underlies ingroup favoritism (Henri Tajfel & Turner, 1986). Whether identification does or does not lead to outgroup derogation depends on individual and contextual factors, such as legitimacy and stability of groups' status relations and permeability of group boundaries (Brewer, 1999; Brown, 2000; Naomi Ellemers, 1993). Much of intergroup bias, prejudice, and discrimination is motivated by preferential treatment of the ingroup rather than direct hostility towards outgroups (Brewer, 1999). Meta-analytical evidence supports the SIT prediction that bias results from identification with and the desire to benefit the ingroup (Balliet, Wu, & De Dreu, 2014).

How does SIT theorizing apply to situations when information about others' multiple group memberships is available? Most of the evidence addressing this question comes from crossed categorization literature. The crossed categorization paradigm uses two intersecting dimensions of social categorization that create four targets: double ingroup, double outgroup, and two targets with mixed group memberships. The patterns of evaluations of these four targets are then assessed. Studies using this paradigm show that importance of a category affects evaluation patterns of the four targets (Urban & Miller, 1998). When a dimension is deemed important, it tends to dominate perception, leading to the category dominance pattern in which the second, less important dimension is either ignored or has a weaker effect on evaluations (Hewstone et al., 1993). The dual-route model of crossed categorization suggests

that category importance moderates the effects of categorization dimensions both through cognitive and affective routes. Category importance increases category salience and accessibility, which in turn make it more readily available both for cognitive processing and affective evaluation (Crisp et al., 2003).

Most studies that looked into the role of category importance either use primes to make certain categories more salient (Crisp & Hewstone, 2007), or estimate the importance of different categories post hoc (Urban & Miller, 1998). No studies have yet investigated what makes certain categories more important than others in multiple categorization settings outside the laboratory. We propose that subjective importance of a group membership to the self (i.e., strength of identification) can explain category importance in multiple categorization settings. We hypothesize that the higher the importance of categorization dimension to the self, the stronger is intergroup bias on that dimension (H1). Considering the universality of cognitive processes underlying identification (Turner et al., 1987), we expect this effect to be similar across various dimensions of social categorization.

Conflict

RGCT puts contextual and situational factors to the fore and explains prejudice through competition for resources. The key mechanism that the theory suggests is negative interdependence of the groups: If a situation is viewed as a zero-sum game, this will lead to competition, conflict, and prejudice (Sherif et al., 1961). Studies in psychology, anthropology, and sociology demonstrate that competition for resources leads to greater intergroup hostility (Divale & Harris, 1976; Esses et al., 2005; Jackson, 1993). The theory was later incorporated into the Integrated Threat Theory (Stephan & Stephan, 2000) and studies within this paradigm suggest that realistic threat predicts prejudice over and above other types of threat.

No studies have yet considered the role of intergroup conflict in strength of intergroup bias in multiple categorization settings. Based on evidence from studies presented above, we hypothesize that the higher the perceived salience of intergroup conflict on a categorization dimension, the stronger is intergroup bias on that dimension (H2). Considering the importance of the history of intergroup relations in perceptions of conflict, we expect this effect to be more prone to contextual influences.

Symbolic threat

Not only realistic, but also less tangible, symbolic threat can lead to prejudice (Allport, 1954; Kinder & Sears, 1981). ITT expands the concept of symbolic racism to all intergroup relations and defines symbolic threat as threat to an ingroup's "way of life", which arises from perceived incompatibility of the ingroup's and the outgroup's values, beliefs, and norms (Stephan & Stephan, 1996, 2000). Meta-analytical evidence suggests that the explanatory power of symbolic threat in predicting outgroup attitudes is as strong as that of realistic threat (Riek et al., 2006).

The potentially important role of perceived threat in crossed categorization effects has been discussed in earlier studies, however without conclusive empirical evidence (Hewstone et al., 1993; Migdal et al., 1998). Theoretically, perceived threat can affect the strength of bias in multiple categorization settings through both cognitive and affective routes. Threatening groups may attract more attention (cognitive route) and evoke negative emotions (affective route), leading to higher salience of the respective dimension. We therefore expect that the higher perceived symbolic threat from an outgroup, the stronger the intergroup bias on that dimension (H3). Taking into account the evidence that the effect of threat on attitudes is stronger when the target group has low vs. high status (Bettencourt et al., 2001; Riek et al., 2006; Stephan et al., 2002), we expect the effect of symbolic threat to be present across dimensions, but stronger for target groups with lower status.

Current study

The motivation behind this study is to explore generalizability of three major theories of intergroup relations by investigating their predictive power in a realistic setting. To reflect the reality of everyday interactions, we use multiple dimensions of social categorization. We aim to address some key limitations of multiple categorization research with regard to ecological validity. This includes (1) the frequent use of artificial groups in laboratory settings (Ensari & Miller, 2001), (2) use of only two categorization dimensions (Nicolas et al., 2017), and (3) homogeneity of samples and regional bias.

To address these limitations, we employ a cross-cultural sequential mixed-methods design. First, we select four countries representing contrast cases for country-level inequality and acceptance of cultural diversity[6]: Australia, Armenia, Brazil, and India. This cross-cultural design allows testing the generalizability of the theories across markedly different contexts and addresses the regional bias of earlier studies (Boehnke, Lietz, Schreier, & Wilhelm, 2011). Second, we conduct interviews with local experts on intergroup relations in each country to select dimensions that are relevant for the context. The results of the expert interviews are then used to design a factorial survey experiment where all the selected dimensions are manipulated. Factorial survey designs combine the benefits of experimental and field studies, allowing manipulation of multiple independent variables and implementation in a survey format (Jasso, 2006a). Factorial surveys are also less prone to social desirability effects compared to other self-report measures (Armacost et al., 1991). Finally, we address the issue of sample heterogeneity by recruiting participants from all social groups that are included in the study. The sample includes both majority and minority group members on each categorization dimension studied.

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[6] We used this contrast cases approach to test predictions about country-level determinants of intergroup bias. The results of country-level analyses are presented in Chapter 5.

All study materials, including the questionnaires, data, syntax, and the pretest report can be found on Open Science Framework platform: https://osf.io/2nrbm/?view_only=bd66e92f766446d8b2763de039752ee2.

<div align="center">**Selection of categorization dimensions**</div>

Method

Participants. We interviewed ten to eleven experts on intergroup relations in each country (N_{total} = 41; 20 female). Most of the experts were researchers. Disciplinary backgrounds included social psychology, sociology, political science, history, and social sciences (interdisciplinary).

Design and Procedure. The experts in each country responded to a semi-structured online questionnaire. The instruction read: "Please go through the list of different possible dimensions for categorizing people into groups and rank these dimensions in terms of how relevant or important they are in [Country] for people's perceptions of each other." The list of dimensions was based on group memberships that frequently appear in studies of intergroup relations: gender, age, occupation, education, income, political views, place of residence (within country), citizenship, migration status, religion, race, ethnocultural background, mother tongue, proficiency in [country's official] language, ability/disability, and sexual orientation. Then, experts were asked: "Are there any other important ways of categorizing people in [country] that were not listed above? Please list all the categorization dimensions that were not mentioned before."

Results

The intra-class correlation (ICC) for inter-rater reliability varied between 0.66 and 0.87 across countries. To determine which dimensions should be included in the main study, we ran repeated measures ANOVA with simple contrasts in each country, comparing the rank of the first (most important) dimension with each of the following dimensions (see Tables

S2.1.1 – S2.1.4 in SM). We dropped dimensions that ranked significantly lower than the first dimension, starting from the lowest ranking dimension. For the open-ended question, the dimension was considered for inclusion if at least third of the experts mentioned it. This was the case only with caste in India (mentioned by eight out of ten experts in India).

We then integrated the results of within-country analyses. Gender, occupation, income, and ethno-cultural background were found to be important in all four countries; age and education in three countries; race, religion, and place of residence in two countries. All these dimensions were included in the main study in all four countries. We combined the dimensions of ethnocultural background and race, as both refer to socially constructed cultural groups of significance based on origin. Additionally, there were categorization dimensions that were identified as important only in one of the countries. English language proficiency was only important in Australia, sexual orientation in Armenia, political views in Brazil, and caste in India. These dimensions were incorporated into the vignette setup as country-specific dimensions. Below we elaborate how the stimuli were designed.

Main study

Method

Design. To maximize the power of a factorial design, the number of dimensions should be divisible by the number of levels per dimension (Auspurg & Hinz, 2015). We identified nine dimensions for inclusion in the main study; hence, the optimal number of levels to represent each dimension was three. We aimed for functional equivalence (Fontaine, 2005; van de Vijver & Leung, 1997) of selected groups rather than exact match between countries (for example, religious groups differed across countries, but always represented the majority and the largest minority religion in the country, plus a category of "not religious"). To select the groups to represent the dimensions that were closely linked to the country context (e.g., ethnic or religious groups), we conducted two to four informal interviews with

residents of each country. For ethnicity and religion, we included the majority ethnic group in each country and two minority groups with relatively high and low status. For the dimensions of education, occupation, and income, the groups were selected to represent conceptual categories 'low', 'average', and 'high', but the specific labels were selected to be relevant to the local context. We excluded combinations of group memberships that were perceived as highly implausible by the interviewees (for example, having a professional job and low level of education in Brazil and India), as inclusion of unrealistic vignettes can compromise data validity (Auspurg & Hinz, 2015). Table 4.1 summarizes the categorization dimensions and categories included in the vignette setup in each country. We provide a more detailed account of dimension and category selection in each country in the SM.

With nine dimensions and two to three levels per dimension, the vignette universe (all possible combinations of all group memberships) was N = 13122 per country (3x3x2x3x3x3x3x3x3). To sample a set of vignettes that would be representative of the vignette universe and allow orthogonality of vignette dimensions and balanced representation of all levels, we employed a D-efficient fractionalized design (Duelmer, 2007). D-efficiency coefficients of 90 and higher provide sufficient power to estimate the causal effects of vignette dimensions on the dependent variable (Auspurg & Hinz, 2015). We used SAS Enterprise software to sample the vignettes (SAS Institute Inc., Cary, 2011). We sampled thirty vignettes in each country and split the sampled vignettes into three sets of ten vignettes. Methodological studies on factorial survey designs suggest that evaluating more than ten vignettes in a single questionnaire can cause participant fatigue and, as a result, poor data quality (Auspurg & Hinz, 2015). The distribution of factor levels by vignette sets can be found in Table S2.3 of the SM. The D-efficiency coefficients varied between 92.55 and 98.02, indicating sufficient power of the design in all countries.

Participants. Aiming to overcome the underrepresentation of minority groups in studies of intergroup relations (Hindriks et al., 2014), we used non-probabilistic quota sampling to represent all the social categories that were included in the vignettes. Two criteria were used to determine the sample size at the country and the group level. For the country level, we followed recommendations of Maas and Hox (2005) and aimed at 100 participants per vignette set (required sample size for the second level units in multilevel models). Hence, to achieve sufficient power for the three sets of vignettes, the desired sample size was 300 participants per country (100 respondents x 3 vignette sets). For the group level, we followed Auspurg and Hinz's recommendation (Auspurg & Hinz, 2015) to aim for at least 5 participants per version of the questionnaire; thus, the desired sample size was at least 15 participants per group.

Participants in Australia, Brazil, and India were recruited from a research panel of a survey company Lightspeed that specializes in digital data collection. The company does not offer panels in Armenia. Data collection in Armenia was conducted by the Turpanjian Center for Policy Analysis at the American University of Armenia. Where online access to participants was not possible (hard-to-reach minority groups in Australia, Armenia, and India), the survey was administered as a computer-assisted personal interview by local research assistants. Overall, we sampled 103 groups in four countries; the desired sample size was reached for 100 groups. Total sample size was $N = 1281$ ($N_{AU} = 359$, $N_{AR} = 311$, $N_{BR} = 282$, $N_{IN} = 329$). As each participant evaluated ten vignettes, this amounted to $N = 12810$ observations. Even the smallest subsample ($n = 7$) still provides sufficient data for the analysis with $n = 70$ of observations. Table 4.1 combines the summary of dimensions and group memberships used in the vignettes and number of participants from each group in the sample.

Table 4.1. Groups represented in the vignette setup and in the sample

Dimension	Group 1	N	Group 2	N	Group 3	N
Australia, N$_{total}$ = 359						
Age	Young	59	Middle-aged	216	Elderly	84
Ethnicity	European Australian	267	Asian Australian	35	Aboriginal Australian	46
Gender	Female	189	Male	168		
Place	Capital city	212	Regional town	109	Country Australia	38
Religion	Christian	171	Muslim	19	Not religious	166
English language proficiency	Is a native Australian English speaker	292	Is fluent in English, but doesn't sound Australian	59	Has difficulty speaking English	8
Education	Has a university degree	119	Completed vocational training	171	Completed high school to year 10	69
Occupation	Has a professional job	187	Tradesperson	163	Unemployed	9
Income	Better off than the average Australian	54	On a par with the average Australian	188	Worse off than the average Australian	117
Armenia, N$_{total}$ = 311						
Age	Young	225	Middle-aged	59	Elderly	27
Ethnicity	Armenian	273	Yazidi	17	Russian	21
Gender	Female	200	Male	109		
Place	Yerevan	167	Regional town	96	Villager	48
Religion	Christian	236	Yazidi	17	Not religious	54
Sexual orientation	Heterosexual			289	Homosexual	22
Education	Has a university degree	234	Attended college	36	Completed high school	41
Occupation	Skilled professional	215	Low-skilled worker	42	Unemployed	54
Income	Is wealthy	67	Has an average income	142	Is poor	102
Brazil, N$_{total}$ = 282						
Age	Young	122	Middle-aged	133	Elderly	27
Ethnicity	White	166	Black	25	Mixed race	91
Gender	Female	141	Male	140		
Place	Capital city	135	Regional town	130	Village	17
Religion	Catholic	122	Evangelical	101	Not religious	59
Political views	Apolitical	151	Supports the right	84	Supports the left	47
Education	Has a university degree	168	Completed high school	76	Completed primary school	38
Occupation	Skilled professional	214	Low-skilled worker	61	Unemployed	7

Dimension	Group 1	N	Group 2	N	Group 3	N
Income	Rich	60	Has an average income	170	Poor	52

India, N_{total} = 329

Dimension	Group 1	N	Group 2	N	Group 3	N
Age	Young	161	Middle-aged	146	Elderly	22
Ethnicity	Bihari	69	Bengali	108	Tamil	140
Gender	Female	127	Male	201		
Place	Capital city	181	Regional town	109	Village	39
Religion	Hindu	283	Muslim	27	Not religious	19
Caste	Forward Caste	175	Scheduled caste	47	OBC*	107
Education	Has a university degree	281	Studied up to high school	33	Studied up to primary school	15
Occupation	Professional	258	Laborer	49	Unemployed	22
Income	Rich	27	Has an average income	256	Poor	46

Note. *OBC – Other Backward Class. Participants were assigned to groups based on

their self-reported demographic background (see Procedure and measures for details).

Procedure and measures. The survey was set up on the online survey platform

Unipark. All participants received an informed consent form at the beginning of the

questionnaire and only those who agreed to participate were given access. Participants were

presented with one of the three sets of vignettes, chosen at random. Except for variation in the

vignette sets, the questionnaires were identical. We used both the translation/back translation

technique and committee approach to translate the questionnaires (Harkness, van de Vijver,

& Mohler, 2003; van de Vijver & Hambleton, 1996). To ensure the quality of the

questionnaire, we conducted a pilot study with 30 to 34 participants in each country (N_{total} =

189). The questionnaire was administered in English in Australia, in Armenian and Russian

(for the Russian minority) in Armenia, and in Portuguese in Brazil. In India, participants

could choose between Hindi and English versions of the questionnaire.

Vignettes. The questionnaire started with the vignette evaluation task. The instruction

read "Below you will read descriptions of 10 different people living in [Country]. Please

evaluate each person using the scales after each description. You need to choose a number on

a scale from 1 (Not at all) to 6 (Very much) that best describes your attitude towards a person. There are no right or wrong answers, we are interested in your opinion." Then ten vignettes were presented in a randomized order. The order of presentation of the vignette dimensions within each vignette was kept constant. Examples of vignettes: "A young Bihari woman. She lives in a village. She is Muslim. She belongs to a Scheduled Caste. She studied up to high school and works as a laborer. She has an average income." (India); "An elderly Asian Australian man. He lives in a regional town. He is not religious. He is a native Australian English speaker. He completed vocational training and works as a tradesperson. Financially, he is worse off than the average Australian." (Australia). Three questions were used to measure the attitude towards the vignette person: "I like this person", "I respect this person", and "I want to engage with this person". Liking and respect were aimed at covering the warmth and competence dimensions of perception, and the last question measured the behavioral component of the attitude. Cronbach's α for this measure varied from .81 to .92 across countries.

Socio-demographic variables and shared group membership. The second part of the questionnaire assessed socio-demographic characteristics of the participants. We measured all nine dimensions of categorization included in the vignette setup to be able to identify whether the participant and the person described in the vignette shared a group membership on each of the dimensions. For each dimension, we coded an observation as an "ingroup", if a participant and the target person belonged to the same group on that dimension and as an "outgroup" if they belonged to different groups.

Gender, with categories 'Female', 'Male', and 'Other' (open-ended).

Age. Exact age and self-identified age category 'young', 'middle-aged', and 'elderly'. The latter was used to code shared group membership.

Place of upbringing and residence. Two questions were included: "Where did you grow up?" and "Where are you currently living?" with categories 'In a capital city', 'In a regional town', and 'In a village/countryside'. We used the former question to code shared group membership.

Ethnicity. "Please indicate to which of the following groups you consider yourself to belong?" Only those ethnic groups that were included in the study design were included as response categories, plus a category of 'Other'. For bi-cultural participants, we included an additional question: "If you consider yourself to belong to more than one of these groups, please indicate which of the other groups you belong", with the same response options.

Religion. "Are you religious and if yes, which religion do you belong to?" with a category 'Not religious' and categories representing the most widespread religions in the country (e.g., Christianity, Buddhism, and Islam in Australia). Additionally, we included categories of 'Other' (open-ended) and 'I do not want to answer this question'.

Level of education. "What is the highest level of education that you have attained?", the categories were tailored to the educational system in each country based on measures used in international surveys, such as World Values Survey and International Social Survey Programme.

Employment status. "Are you currently working for pay, did you work for pay in the past, or have you never been in paid work?" with categories 'I am currently in paid work', 'I am currently not in paid work', and 'I have never had paid work'. If participants answered that they worked for pay currently or in the past, they were directed to another question to determine whether the work they had could be classified as a 'low-skilled' or a 'professional' occupation. We asked participants to describe their current job, or, if not currently employed, their last job. Three items measured the job status: "Does your job require a high level of education?", "Is it a high-paying job", and "Does it require high level of skills?" Three-point

response scale was offered, with 'No', 'To some extent', and 'Yes'. Participants who scored two or higher on the scale were categorized as 'professionals' and those who scored lower as 'low-skilled workers'. Those who have never been in payed work were categorized as 'unemployed'.

Income. To measure perceived financial status, we asked "In terms of income, to which of the following groups you consider yourself to belong?" Response categories indicated low, average, and high income levels, but the specific labels were tailored to country (e.g., 'lower class', 'middle class', and 'upper class' in India; 'worse off than the average [country resident], 'about the same as the average [country resident]', 'better off than the average [country resident]' in other countries).

Country-specific dimension. In each country, we additionally asked about participant's group membership on the dimension that was included as a country-specific dimension in the vignette setup. In Australia, this was English language proficiency. We first asked "Are you a native Australian English speaker" ('Yes' or 'No'). For participants you responded 'No', we followed up with a question "How well do you know English?", with response categories 'Native English speaker', 'Fluent in English', and 'Have difficulty speaking English'. In Armenia, given that the topic of sexual orientation is a taboo and a direct question might have elicited negative reactions from the participants, we instead asked "Do you consider yourself a member of the LGBT community?" ('Yes' or 'No'); an explanation of the abbreviation LGBT was provided as well. In Brazil, we asked "What is your political orientation?", with response categories 'I have no interest in politics', 'I support parties on the left', and 'I support parties on the right or center'. In India, the classification for castes paralleled the one selected for the vignettes. The question read "Please indicate which of the following groups you consider yourself to belong to?", with

response categories 'Forward caste', 'Scheduled caste / Scheduled tribe', 'OBC'[7], and a category of 'Other'.

Identification, conflict, and threat. The following three sections measured identification, salience of intergroup conflict, and symbolic threat on each dimension.

Identification. "To what degree are the group memberships listed below important to your sense of who you are?" Each dimension ('My gender', 'My age', 'My religion (or being not religious)') was evaluated using a 6-point scale from 1 – 'Absolutely unimportant' to 6 – 'Extremely important'.

Salience of intergroup conflict. The instruction read: *"*All people around you can be described in terms of social groups they belong to, for example, men and women, or younger and older people. Some of these groups are in conflict with each other (for example, for resources or power), and some are not. Below is the list of different social groups that exist in [Country] society. Please assign a score to each of the groups listed below depending on to what degree you think these groups are in conflict with each other in [Country]". The list included the same nine dimensions, phrased in terms of opposing group memberships (e.g., 'Men and women', 'Younger and older people', 'People with different religious beliefs', etc.). The response scale ranged from 1 – 'Not in conflict at all' to 6 – 'In a severe conflict'.

Symbolic threat. Following the definition of symbolic threat as perceived incompatibility of own group's values and beliefs with those of outgroups (Kinder & Sears,

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[7] This is an official classification used by the Government of India to acknowledge the disadvantaged groups within the country. The official classification is applied to all Indian population, irrespective of their religious or ethnocultural background. Forward caste is not considered disadvantaged or discriminated against and does not qualify for affirmative action schemes. Scheduled castes or scheduled tribes are the group of people who have historically been discriminated. This group is mainly comprised of people who were previously referred to as "Untouchables" and are currently often referred to as Dalits. Finally, the third category is Other Backward Class (OBC), which includes other disadvantaged groups, such as Shudra class from the traditional Hindu caste system.

1981; Riek et al., 2006), this measure was designed to specifically target outgroup perceptions. We asked participants "How compatible or incompatible are moral values and beliefs of the groups listed below with the values and beliefs of the groups that you belong to?" The list of groups was filtered so that those groups that the participant belonged to (based on previous answers to the socio-demographic questions) were hidden. From the total list of 26 groups per country, each participant on average evaluated 17 groups (e.g. 'men', 'elderly people', 'Muslims', etc.)[8].

Analytical strategy. We used multilevel regression analysis to account for the nested structure of the data, where vignettes are nested within respondents (Joop J Hox, 2010). In each model, we first included vignette characteristics, then dummy-coded indicators of shared group membership between the participant and the target on each dimension, then participant characteristics for control. The measure of intergroup bias is the effect of having a shared group membership with the target on the attitude. We tested the three proposed hypotheses as cross-level interactions, where individual-level scores of identification, conflict, and threat on a given dimension predict the link between shared group membership and attitude. Following recommendations on testing cross-level interactions in multilevel models (Aguinis, Gottfredson, & Culpepper, 2013), we first estimated whether there is significant variation in the slopes of shared group membership predicting attitude between individuals, and tested interactions only for those dimensions that showed such variation.

To avoid inflating false positive rates for the main effects, we adjusted the alpha using the formula proposed by Good (1982) by the smallest sample size at the country level (N = 282 in Brazil). The adjusted p-value of 0.03 was used to estimate the significance of main effects. For interaction terms, we used the conventional cutoff of $p < .05$, as power to detect

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[8] Due to a technical error, perceived symbolic threat was not evaluated for one target group, "People who speak English well, but don't sound Australian".

cross-level interactions is usually considerably lower than the power for estimating main effects (Mathieu, Aguinis, Culpepper, & Chen, 2012). Country-specific models with main effects of vignette dimensions, shared group membership, and respondent characteristics predicting attitudes are reported in Tables S2.4.1 – S2.4.4 of SM.

Results

From the eight dimensions manipulated in the vignettes in all countries, we observed significant ingroup bias on the dimensions of religion (AU: $b = .13$, $SE = .03$, $p < .001$; AR: $b = .17$, $SE = .05$, $p < .001$; BR: $b = .20$, $SE = .03$, $p < .001$; IN: $b = .20$, $SE = .04$, $p < .001$), ethnicity (AR: $b = .17$, $SE = .07$, $p = .012$; IN: $b = .07$, $SE = .03$, $p = .006$), and gender (AR: $b = .08$, $SE = .04$, $p = .025$). Ingroup bias was also observed on country-specific dimensions of sexual orientation in Armenia ($b = .72$, $SE = .07$, $p < .001$) and political views in Brazil ($b = .27$, $SE = .03$, $p < .001$), Figure 4.1 shows strength of bias and its direction across dimensions and countries.

Before proceeding to testing the moderating effects of identification, conflict, and threat, we tested whether the slopes of the effects of ingroup membership on attitude significantly varied between individuals. For this and the following analyses we used the pooled sample of four countries, including country as a fixed effect. To avoid over-fitting, we tested random slopes and interactions for each dimension in separate models. Five out of nine dimensions had significant random slope variation: the country-specific dimension ($\sigma^2_{u1} = 0.596$, $p < .001$), religion ($\sigma^2_{u1} = 0.024$, $p < .001$), ethnicity ($\sigma^2_{u1} = 0.003$, $p = .002$), occupation ($\sigma^2_{u1} = 0.087$, $p < .001$), and gender ($\sigma^2_{u1} = 0.058$, $p < .001$). Therefore, the following analyses were carried out for these five dimensions only. It is worth noting that ingroup membership on the dimensions that did not show significant variation in slopes (age, place, education, income) also did not predict the attitude in any of the countries or in the pooled sample.

Australia — Armenia — Brazil — India (bar charts)
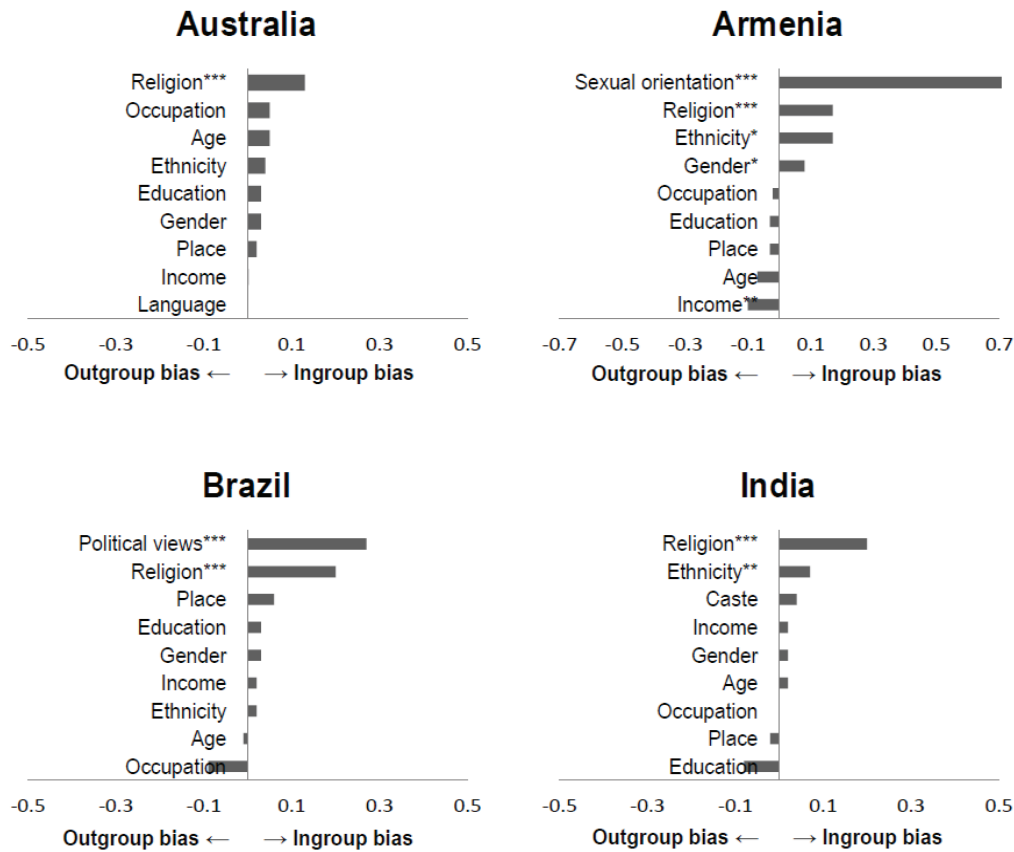
Note. * p < .03, ** p < .01, *** p < .001.

Figure 4.1. Strength of intergroup bias across dimensions and countries.

Identification. We hypothesized that the higher the importance of categorization dimension to the self, the stronger is intergroup bias on that dimension. We asked participants which group memberships are most important to their sense of self. Education and income were consistently rated as very important in all four countries. The rural-urban distinction and religion were consistently rated as least important (see Figures S2.1 – S2.3 in SM for the mean country-level scores of identification, salience of conflict, and perceived threat).

Identification moderated the link between ingroup membership and attitude for all five dimensions. All interactions followed the hypothesized direction: The more important the dimension was deemed for the individual's self-concept, the more intergroup bias occurred on that dimension, supporting H1 (see Fig. 4.2). This was the case for religion ($b = 0.04$, $SE = .01$, $p < .001$), ethnicity ($b = 0.02$, $SE = .01$, $p = .027$), the country-specific

dimension ($b = 0.20$, $SE = .01$, $p < .001$), gender ($b = 0.02$, $SE = .01$, $p = .049$), and occupation ($b = 0.04$, $SE = .01$, $p = .001$). Inclusion of the country in the interaction showed that the pattern is similar across countries, although the effect sizes differed for three out of five dimensions. The effect for religion was the strongest in Australia and for occupation and the country-specific dimension, in Armenia.
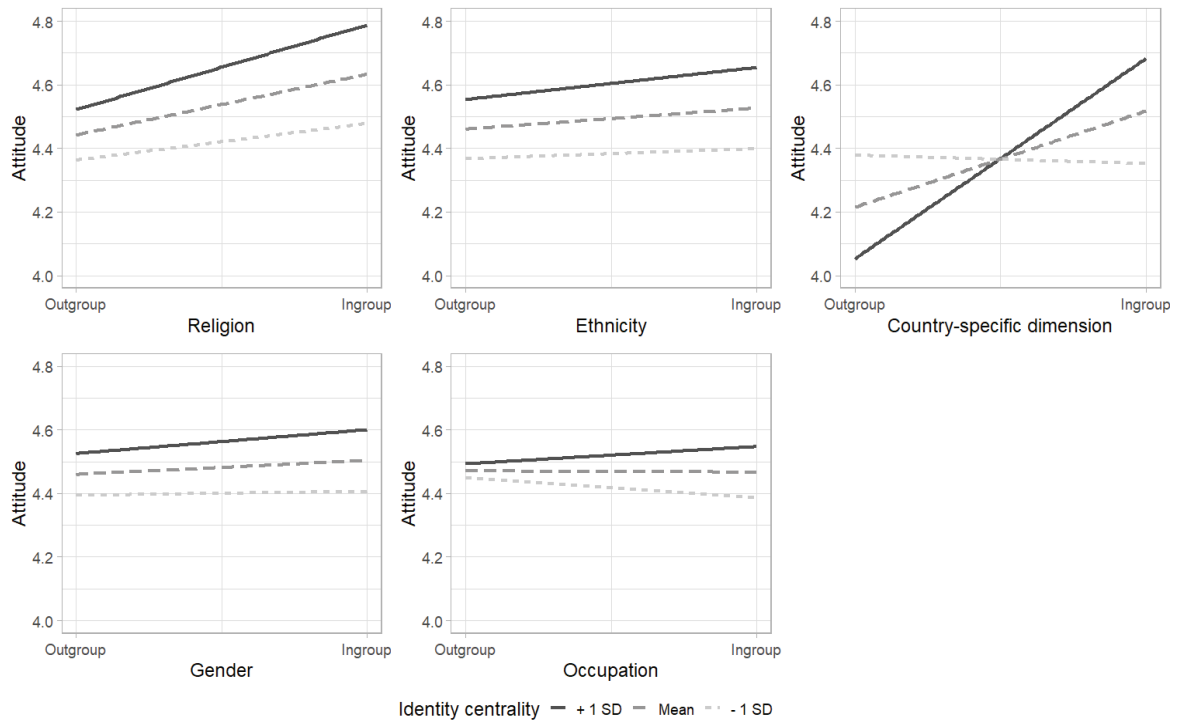
Figure 4.2. Intergroup bias as a function of identity importance.

Salience of intergroup conflict. We hypothesized that the higher the perceived salience of intergroup conflict on a categorization dimension, the stronger is intergroup bias on that dimension. Participants in all countries perceived religion- and income-based groups in their country to be in a strong conflict. Groups based on sexual orientation in Armenia, ethnicity in Australia, political views in Brazil, and caste in India were also perceived as being in conflict. Place of residence received the lowest scores on conflict in all countries.

The interaction between perceived conflict and ingroup membership on a pooled sample was significant only for the country-specific dimension[9] ($b = 0.16$, $SE = .02$, $p <$ .001). A 3-way interaction with the country as the second moderator revealed the pattern to be similar in three out of four countries: higher perceived conflict was associated with more ingroup bias in Armenia, Australia, and Brazil, although the effect was significantly stronger in Armenia (compared to Australia, $b = 0.21$, $SE = .05$, $p < .001$). The interaction was reversed in India, with higher perceived conflict associated with less ingroup bias ($b = -0.04$, $SE = .02$, $p = .04$). Fig. 4.3 illustrates these interactions by country. These results provide partial support for H2.
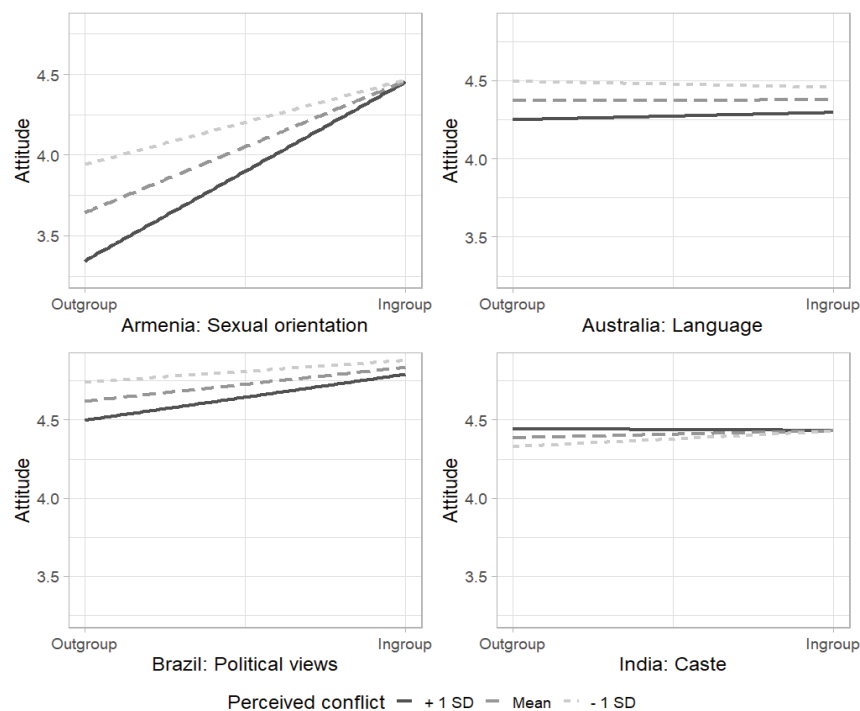
Figure 4.3. Intergroup bias as a function of salience of intergroup conflict.

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[9] We also explored the possibility of country-specific effects on other dimensions. The three-way interactions revealed significant effects for religion and gender. The within-country analyses indicated that higher salience of religious conflict predicted stronger intergroup bias in Australia ($b = 0.06$, $SE = .02$, $p = .004$) and higher salience of gender conflict predicted weaker intergroup bias in Armenia ($b = -0.08$, $SE = .03$, $p = .01$).

Symbolic threat. We hypothesized that the higher perceived symbolic threat from an outgroup, the stronger the intergroup bias on that dimension. Participants evaluated outgroup members on each dimension on how incompatible these groups' moral values and beliefs are with their own membership groups' values and beliefs. Religious outgroups were perceived as most threatening in all countries. Outgroups on the country-specific dimensions were also at the top, such as people who have difficulty speaking English in Australia, homosexuals in Armenia, and people with left-wing political views in Brazil. Women, age-based and place-based groups were among the least threatening outgroups in all countries.

To test interactions with symbolic threat, we used the vignette dimensions instead of coded shared group membership, as all evaluations refer to outgroup members. For this analysis, we first tested which of the vignette dimensions have significant variation in slopes between individuals. The random slopes were significant for five out of nine dimensions: gender ($\sigma^2_{u1} = 0.08$, p < .001), religion[10] ($\sigma^2_{u1} = 0.16$, p < .001), occupation ($\sigma^2_{u1} = 0.12$, p < .001), income ($\sigma^2_{u1} = 0.04$, p = .04), and the country-specific dimension ($\sigma^2_{u1} = 0.66$, p < .001).

Income was the only dimension where we found no interaction effect for any of the three groups: the rich ($b = -0.019$, $SE = .02$, $p = .180$), the average-income ($b = -0.003$, $SE = .04$, $p = .943$), or the poor ($b = -0.039$, $SE = .03$, $p = .254$). For gender, symbolic threat moderated the relationship between target's gender and attitude when the target was a man ($b = -0.051$, $SE = .02$, $p = .01$), but not when it was a woman ($b = -0.005$, $SE = .02$, $p = .821$).

For all other dimensions, the following pattern emerged: threat moderated the relationship between target's group membership and attitude when the target was a minority or lower-status group member, but not when the target was a member of the dominant group.

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[10] Religion, occupation, income, and the country-level dimension are factors with three levels, so there are two estimates for the random slopes in each case. We report here the larger of the two estimates.

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For religion, there was no effect for evaluations of the religious majority ($b = 0.012$, $SE = .02$, $p = .551$), but we found significant interactions for the minority group ($b = -0.149$, $SE = .02$, $p < .001$) and for non-believers ($b = -0.069$, $SE = .02$, p $< .001$). Similarly, on the dimension of occupation we found no interaction for the group of professionals ($b = 0.048$, $SE = .03$, $p = .141$), but significant interactions for workers ($b = -0.064$, $SE = .02$, $p < .001$) and unemployed people ($b = -0.118$, $SE = .02$, $p < .001$).

For the country-specific dimension, we tested the interaction effects separately for each country. Despite different dimensions used across countries, the pattern was identical. We found no interaction effect for native English speakers in Australia ($b = .014$, $SE = .05$, $p = .793$), but a significant interaction for those who have difficulty speaking English ($b = -0.116$, $SE = .02$, $p < .001$). In Armenia, threat did not moderate the link between group membership and attitude for heterosexual targets ($b = .121$, $SE = .11$, $p = .301$), but did moderate this link for homosexual targets ($b = -0.336$, $SE = .05$, $p < .001$). In Brazil, no interaction was present for targets who were described as apolitical ($b = -0.031$, $SE = .036$, $p = .388$), but there was a significant moderation for both political right ($b = -0.109$, $SE = .03$, $p < .001$) and left ($b = -0.120$, $SE = .03$, $p < .001$). Although the effects were not significant in India, the trends were similar to other countries: Evaluations of the higher-status Forward caste were not moderated by threat ($b = -0.008$, $SE = .03$, $p = .774$), whereas effect sizes for the two lower-status castes were similar to those found in other countries ($b = -0.051$, $SE = .03$, $p = .128$ for Scheduled caste and $b = -0.056$, $SE = .03$, $p = .105$ for OBC).

Discussion

With increasing mobility and diversity in the world, scholars across the social sciences call for attention to the issue of multiple group memberships and their intersections in the study of prejudice and discrimination (e.g., Cole, 2009; Crisp & Hewstone, 2007; Vertovec, 2007). Answering this call, the present study is the first to test the predictive power

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of established determinants of intergroup bias, namely identification, conflict, and threat, in multiple categorization settings. The study goes beyond existing research on crossed and multiple categorization by (1) taking a culture-sensitive approach to the selection of dimensions and categories; (2) using a research design that allows manipulation of multiple dimensions in a survey setting; (3) sampling both majority and minority group members on all dimensions used from various cultural contexts.

Comparing the generalizability of theories of intergroup relations

Our findings suggest that from the three theories tested, SIT has the greatest generalizability in predicting the strength of intergroup bias across dimensions of social categorization. For all five dimensions that showed significant bias and variation in strength of bias across individuals, identification predicted this variation in the expected direction. The higher participants rated the importance of their religious, ethnic, gender, and occupational identity for their sense of self, the stronger bias they showed on the respective dimensions of categorization. The predictive power of identification also demonstrated generalizability across cultural contexts, as we observed the same effect for the country-specific dimensions: language in Australia, sexual orientation in Armenia, political views in Brazil, and caste in India. The strength of the effects varied across countries, but the direction was stable in all tests.

These findings provide strong supporting evidence for the universality of the cognitive explanation of intergroup bias. They also contribute to the debate on the relationship between group identification and ingroup bias (Balliet et al., 2014; Brewer, 1999; Brown, 2000), demonstrating that for most group memberships, identification does lead to stronger preference for the ingroup members. Importantly, as Fig. 4.2 shows, the observed interactions with identification were driven not by more negative evaluations of the outgroups, but by more positive evaluations of the ingroup members by high-identifiers. By

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contrast, effects of conflict were driven by outgroup attitudes becoming more negative when groups were perceived to be in conflict (Fig. 4.3).

Compared to SIT, we found the predictive power of RGCT to be limited. Across countries, salience of intergroup conflict explained strength of bias only on the country-specific dimension. Notably, the country-specific dimensions were the ones that experts in each country rated as particularly important for that specific context. One could speculate that the group memberships that are perceived as particularly conflicting would be the ones that experts considered to be particularly important. Supporting this speculation, the country-specific dimensions of sexual orientation in Armenia and political views in Brazil received the highest scores on the measure of conflict, and caste was rated as second highest on conflict in India. In case of Australia, language received an average score on conflict and the effect of perceived conflict on the strength of bias on the dimension of language was also the weakest in Australia. This leads us to a proposition that salience of intergroup conflict at the individual level predicts bias only when the conflict between the groups is highly salient at the group level.

Contrary to our predictions, salience of intergroup conflict was not always associated with stronger bias. For caste in India and gender in Armenia, we found a negative relationship between the salience of intergroup conflict and intergroup bias. This can indicate that conflict is not a reliable predictor of intergroup bias on the individual level. Another plausible explanation for this finding is that our measure of conflict conflates realistic threat due to conflict and sensitivity to it. For example, it is likely that participants who stated that different castes in India are in a strong conflict are the ones who are most critical towards the caste system. Therefore, higher ratings on salience of intergroup conflict on such dimensions as gender in Armenia and caste in India are likely indications of greater social awareness rather than (or just as much as) perceived threat.

Similar to SIT, symbolic threat showed predictive power across a wide range of categorization dimensions. Greater perceived threat predicted stronger intergroup bias on the dimensions of religion, gender, occupation, and the country-specific dimensions of language, sexual orientation, political views, and caste. In line with the meta-analytical evidence on the effects of perceived threat on outgroup attitudes (Riek et al., 2006), threat predicted attitudes towards lower-status outgroups, but not the dominant group. Importantly, the strength of the effect was associated with the target group's status. For example, on the dimensions of religion and occupation, the effect was twice as strong for attitudes towards religious minority group compared to non-believers and for the unemployed compared to workers.

Gender was an exception to this rule: higher perceived symbolic threat predicted more negative attitudes towards men, but not women. This finding suggests that the predictive power of symbolic threat may be contingent not upon target group's low status (as men are the dominant group), but rather upon how threatening the target group is. Country-level scores on perceived symbolic threat support this proposition: minority group members on the dimensions of religion, occupation, language, sexual orientation, and political views are perceived as more threatening by the dominant group than the dominant group is perceived by minorities, and men are perceived as more threatening by women than women are by men.

Comparing strength of bias between individuals and between categorization dimensions

Although strength of identification on a dimension robustly predicted strength of bias on that dimension, average importance of various group memberships to individuals in the country did not correspond with the strength of bias in the same population. The higher an individual would rate importance of a category to their identity, the more bias we observed. On aggregated level, however, group memberships that were rated, on average, as most important (socioeconomic dimensions: education, occupation, income) did not produce intergroup bias, whereas group memberships that were rated as less important (sociocultural

dimensions: religion, ethnicity) did produce intergroup bias. This is an interesting disagreement that points to possible differences in grounds people use for self- and other-categorization.

Socioeconomic status defines our everyday experiences and interactions, whereas our sociocultural group memberships might not always be salient. Moreover, memberships in socioeconomic groups might be more useful for self-evaluations, as, first, these are the lines of categorization that societies use to ascribe success and worth and, second, they can be changed and are perceived to be under individuals' control. Sociocultural groups are perceived in essentialist ways (Haslam, Rothschild, & Ernst, 2000), thus providing no possibility for change or control. These individuating functions of socioeconomic groups make them more useful for making inter- and intra-individual comparisons, whereas sociocultural groups are more useful for intergroup comparisons. These propositions can be addressed in future research.

Unlike identification, hierarchies of conflict and threat across countries closely resembled the hierarchies of strength of intergroup bias. Group memberships on the dimensions of religion and ethnicity, along with the country-specific dimensions of political views and sexual orientation, were perceived to be in a strong conflict and were among the most threatening groups. The same group memberships were responsible for the strongest intergroup bias in the respective countries.

These differences between identification on one hand, and conflict and threat on the other, point to another unaddressed question in prejudice research: how can we explain hierarchies of bias within individuals and groups? When predicting strength of bias from measures of identification, conflict, and threat, we make inter-individual comparisons. If one individual rated religion as more important to their self-concept than another individual, then the first individual will also show more ingroup bias on the dimension of religion. However,

this does not yet tell us which of the categorization dimensions will produce more bias on an aggregate level. We can speculate that SIT is better suited for explaining differences in the strength of bias between individuals on a single categorization dimension, conflict is more predictive of which dimension of social categorization will produce more bias (compared to other dimensions) in a group of individuals, and symbolic threat can explain both.

Limitations and future directions

By using large and diverse samples and an experimental design that provides not only high internal, but also high external validity, this study offers a reliable and rigorous test of the hypotheses in question. Nevertheless, certain limitations remain. First, the measure of salience of intergroup conflict does not provide a differentiated assessment of perceived realistic threat from specific outgroups. Presumably, such measure could have yielded stronger effects of perceived conflict at the individual level. Our measure provides an accurate estimate of hypothesis derived from RGCT. However, RGCT is best suited for the group level of analysis and if the individual level of analysis is the focus of interest, future studies would benefit from using measures of realistic threat more closely aligned with the ITT theorizing.

Second, this study does not allow making strong claims about the strength of the effects, as conventional effect size estimates do not apply to multilevel models. Obtaining standardized regression coefficients in a multilevel model requires standardizing all variables before entering them to the model. This might change the estimates of variance components, which is especially problematic if the model includes dummy variables as predictors and random slopes (Hox, 2010). However, considering all predictor variables for group membership are dummy variables and identity, conflict, and threat are all measured on a 6-pt scale, the unstandardized estimates are comparable within constraints.

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The scope of the current study did not allow exploring the richness of the data that factorial survey design and the diversity of our samples offer. Future studies can utilize this data to explore other research questions that could contribute to intergroup relations and multiple categorization literatures. For example, one could investigate whether the patterns of crossed categorization that have been found using two dimensions (Crisp & Hewstone, 2007) generalize to cases with multiple dimensions of categorization. Exploring different combinations of perceiver and target groups can provide a more detailed account of generalizability of different predictions derived from theories of intergroup relations. And last but not least, interactions between different categorization dimensions can be investigated to get a better understanding of the processes behind attitude formation in multiple categorization settings.

Conclusion

The present research advances intergroup relations literature by comparing the predictive power of identification, conflict, and threat in explaining intergroup bias in multiple categorization settings, using diverse samples from different cultural contexts. This approach allowed us to explore the generalizability of three established determinants of prejudice across dimensions of categorization, contexts, and target groups. Our findings suggest that Social Identity Theory offers the most generalizable explanation for ingroup bias on the individual level. Perceptions of intergroup conflict have limited explanatory power, although evidence suggests that, consistent with the group-level focus of the Realistic Group Conflict Theory, conflict might have a greater explanatory power at the group level. We provide strong evidence in support of predictive power of symbolic threat across categorization dimensions. However, our findings also suggest a boundary condition for this effect: threat is related to more negative outgroup attitudes only when the target is a minority or a lower-status group member.

CHAPTER 5

EXPLAINING STRENGTH OF BIAS ON THE SOCIETAL LEVEL

Abstract

This study investigates how people form impressions of others when provided with information about others' multiple group memberships. We identify two different routes through which others' group memberships affect attitudes towards them and demonstrate how social context shapes the inferences drawn from these group memberships. Diverse samples of participants from four countries ($N = 12810$ observations) evaluated vignettes describing the membership groups of individuals living in participant's country. Membership of sociocultural groups (ethnicity, religion) affected attitudes towards the target person via preference for ingroup members. This effect was moderated by inclusive social norms for ethnicity, but not religion. In countries with high average acceptance of cultural diversity, ethnicity of the target person did not affect attitudes, whereas religious outgroups were evaluated more negatively than ingroups in all countries. Membership of socioeconomic groups (education, occupation, income) affected attitudes towards the target person by signaling the position of the individual in a societal hierarchy. This perceived status translated into more positive attitudes towards higher status others for education and occupation, and the effect was stronger in countries with low inequality. The effect was reversed for income: rich were preferred over poor in countries with low inequality and poor were preferred over rich in countries with high inequality. This study offers a novel approach to prejudice research and provides new insights into how people's multiple group memberships affect their perceptions of each other.

Group-based inequalities and discrimination are among the most pressing issues that all societies across the globe have to face. Racial discrimination persists (Quillian et al., 2017; Richeson, 2018) and economic inequality accompanied by devaluation of low-status groups is on the rise (Kuppens et al., 2018; Piketty, 2015). Psychological approaches to intergroup relations strongly rely on the phenomenon of intergroup bias, the preference of own membership groups over outgroups, as the cognitive foundation of prejudice and discrimination (Allport, 1954; Brewer, 1999; Hewstone et al., 2002; Turner, Brown, & Tajfel, 1979). This approach greatly advanced our understanding of psychological underpinnings (Hewstone et al., 2002; Pettigrew, 2016) and consequences (Major & O'Brien, 2004) of prejudice, as well as suggested some tools for prejudice reduction (Paluck & Green, 2009). However, the overwhelming majority of studies on prejudice focus on a single group membership (e.g., race, or religion, or immigration status), whereas in reality people always belong to multiple groups. In recent years, scholars across various areas of the social sciences emphasized the importance of considering the multiplicity of group memberships for the advancement of the study of prejudice and discrimination (Collins, 2015; Crisp & Hewstone, 2007; Vertovec, 2007).

The current study investigates attitude formation when others' multiple group memberships are salient. It builds on two propositions. First, when multiple group memberships are salient, preference for the ingroup is not the only mechanism linking information about others' group memberships to attitudes towards them. We differentiate between sociocultural groups that impact attitudes though intergroup bias and status-groups that impact attitudes through preference for higher status. Second, social context plays an important role in how the information about others' group memberships impacts attitudes towards them.

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We present the results of a cross-cultural factorial experiment that addresses two research questions. First, are the mechanisms linking information about others' group memberships to attitudes towards them the same for different dimensions of social categorization? Second, how do socio-structural characteristics of the environment make specific group memberships more or less important for impression formation? We employ a two-step mixed methods design. We take a culture-conscious approach to study design (Brady, Fryberg, & Shoda, 2018) by interviewing experts on intergroup relations in each country to identify the most relevant dimensions of social categorization in the given context. We then manipulate the identified group memberships in a factorial survey experiment, where participants are asked to evaluate fictitious people described through their membership groups. The results highlight fundamental differences in mechanisms through which group memberships affect attitudes and the key role of social context in shaping how we see others.

Perceiving others through their membership groups

Social categorization is a universal cognitive process of structuring the social world around us in a meaningful way. Two main functions of social groups account for the emergence of intergroup bias. First, the groups we belong to become part of our self-concept and we strive to see these groups in a positive light (Henri Tajfel & Turner, 1979). Second, these membership groups provide us with reference points that reduce uncertainty about the world around (Hogg, 2007). The uncertainty-reduction function of social groups is in line with the evolutionary perspective on group formation. According to this perspective, group identification emerges from intragroup cooperation, which is less costly than cooperation with outgroups, as ingroup norms ensure reciprocal exchange (Brewer & Caporael, 2006). As a consequence, ingroup favoritism easily occurs in smaller groups, where group members have direct interaction and shared goals and norms. However, when it comes to larger social

groups, only some of them can offer similar definiteness of group boundaries and clarity of norms.

People may identify with or be categorized into an infinite number of social groups. Some of these groups are well-structured, have clear group boundaries, and provide their members with a coherent set of normative prescriptions and worldviews. This type of group is particularly efficient in reducing uncertainty about the self and the world around, providing fertile ground for building cooperation and trust within the group boundaries (Hogg, 2000; Hogg & Adelman, 2013). Social categories that reflect sociocultural differences, such as nationality, ethnicity, and religion, are typical examples of such groups. Ingroup membership on such dimensions of social categorization signals sharedness of norms and expectations of cooperation. Does it mean that information about other membership groups is not useful for impression formation? Various independent lines of research in psychology identified two fundamental dimensions of human perception that largely determine how we perceive others': warmth (or liking, communion, interdependence) and competence (or respect, agency, independence) (Fiske et al., 2007). Perceptions of warmth are linked to cooperative interdependence that promotes trust (Brewer, 1999), and perceptions of competence are linked to an assessment of status. Whereas ingroup membership on sociocultural dimensions of categorization will signal cooperative interdependence, group memberships reflecting status will signal competence, providing useful information for evaluating others. Social categories that reflect status differences, such as educational, occupational, or income groups, are typical examples of status-groups.

The two types of group membership can be expected to have different consequences for intergroup perceptions. Due to low permeability of group boundaries and the key role that cultural groups play in understanding the world around us, these are the group memberships most prone to induce intergroup bias (Naomi Ellemers et al., 1988; Hewstone et al., 2002;

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Hogg, 2007). Hence, we expect cultural dimensions to affect attitudes towards others through ingroup favoritism, i.e., people will evaluate ingroup members more positively than outgroup members. In contrast, the status-related group memberships should not induce intergroup bias. Evidence suggests that low-status groups, instead of identifying with and favoring own group, frequently show dis-identification with the ingroup (Kuppens, Easterbrook, Spears, & Manstead, 2015) and favor the more advantaged groups (Jost et al., 2004). We therefore expect status-related dimensions to affect attitudes via the preference for higher status, irrespective of own group membership. Finally, we expect normative and structural characteristics of societies to moderate the strength of these biases.

Contextual moderators

Context can moderate the effects of group memberships on attitudes by shaping perceptions of who is construed as ingroup vs. outgroup, of permeability of group boundaries and of legitimacy of status relations. We propose two moderators that link to the two types of groups described earlier: acceptance of cultural diversity and inequality.

Acceptance of cultural diversity. Group Norm Theory postulates that our individual prejudices are a product of our socialization (Sherif & Sherif, 1953). We acquire them by internalizing the normatively prescribed and proscribed forms of prejudice and learning to express the former, while suppressing the latter (Crandall et al., 2002). Experimental studies show that manipulation of perceived group norms leads to changes in expressions of prejudice and in discriminatory behavior (Crandall et al., 2002; Paluck, 2009). Field experiments point in the same direction: on the one hand, when prejudice is normalized, people express higher levels of prejudice (Crandall, Miller, & White, 2018); on the other hand, when exposed to more inclusive social norms, people express more inclusive attitudes and become more open to intergroup cooperation (Paluck & Green, 2009). Normative acceptance of cultural diversity at country level can also re-define the group boundaries in a

way that ethnic or religious outgroups are included in the definition of the ingroup via shared superordinate identification with a diverse and multicultural country. To the best of our knowledge, no study to date has looked at how variation in social norms across countries affects intergroup bias. We expect that intergroup bias on cultural dimensions of categorization is weaker in countries where acceptance of cultural diversity is the societal norm.

Inequality. Studies of outgroup favoritism suggest two conditions under which members of low-status groups will show preference for higher-status others. The first condition is the permeability of group boundaries: the easier it is to move from a low-status group to a higher-status group, the less low-status groups identify with the ingroup and the more outgroup favoritism is observed (Naomi Ellemers et al., 1988; Tausch et al., 2015). The second condition is that of the legitimacy of status differences: the more legitimate these differences appear to the low-status groups, the more outgroup favoritism is observed (Haines & Jost, 2000). These two conditions have their socio-structural equivalents: social mobility reflects permeability of group boundaries between low-status and high-status groups, and meritocratic beliefs reflect legitimacy of these status differences. These two conditions are interrelated in the real world. Low social mobility decreases belief in meritocracy, which in turn results in more negative attitudes towards those in the position of power (Day & Fiske, 2017; McCoy & Major, 2007). At societal level, both low social mobility and low meritocracy are correlates of a high level of inequality (Corak, 2013; Newman, Johnston, & Lown, 2015). We, therefore, expect to find a stronger preference for higher status others in countries with lower levels of inequality, as equality is associated with higher social mobility and stronger meritocratic beliefs.

Country selection. To test the moderating role of social context, we employ a quasi-experimental design by selecting four countries that represent contrast cases for acceptance of

cultural diversity (ACD) and level of inequality. We developed the ACD index based on the World Values Survey Wave 6 data, where participants indicated which groups they would not like to have as neighbors. We calculated the number of selected group memberships that related to culture (e.g., "people of a different race", "people of a different religion"). The index represents the average number of groups mentioned by participants in a country, i.e. the higher the score, the less accepting of diversity the country is. For inequality, we used Atkinson's inequality index in income and education. Figures S2.4.1 and S2.4.2 in SM present the highest and lowest ranking countries based on these two indices. Countries selected to represent these contrast cases are Australia for high ACD and low inequality, Armenia for low ACD and low inequality, Brazil for high ACD and high inequality, and India for low ACD and high inequality.

Method[11]

Procedure and measures

We employed a factorial survey (FS) design for the main study. FS is an experimental technique implemented in a survey format. Participants are presented with stimuli resembling real-world situations or objects (in this case – descriptions of people). The characteristics of these stimuli systematically vary on a number of dimensions and participants have to make trade-offs between the dimensions to evaluate the stimuli (Auspurg & Hinz, 2015). FS is a valuable tool for the study of social-psychological phenomena, as it allows investigating the causal mechanisms without compromising external validity of the research design (Jasso, 2006b). FS is also less susceptible to social desirability effects compared to conventional surveys (Armacost et al., 1991; Auspurg & Hinz, 2015).

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[11] Chapter 4 and Chapter 5 are based on the same study, hence the method sections of the two chapters overlap. However, we report methods in each chapter for coherence and readability.

In a factorial survey, the vignette universe represents all possible combinations of all levels of all vignette dimensions. In our study, the combination of two to three levels per dimension, for nine dimensions, resulted in a vignette universe of $N = 13122$ per country (3x3x2x3x3x3x3x3x3). We used a D-efficient fractionalized design to sample the vignettes. D-efficient designs are the best way to ensure a balanced representation of all vignette levels in the sample and orthogonality of vignette dimensions (Duelmer, 2007). D-efficiency coefficients higher than .90 offer sufficient statistical power (Auspurg & Hinz, 2015). We sampled 30 vignettes from the vignette universe in each country, excluding the implausible combinations (e.g., having a professional job and low level of education in Brazil and India). The sampled vignettes were split into three sets, 10 vignettes each, to avoid participant fatigue (Auspurg & Hinz, 2015). We used SAS Enterprise software for vignette sampling (SAS Institute Inc., Cary, 2011). The D-efficiency coefficients for the designs varied between 92.55 and 98.02, providing sufficient power to identify the effects of vignette dimensions on attitude in all four countries. The vignette setup and the D-efficiency coefficients for each country can be found in Table S2.3.

The study was conducted online. The survey was executed on the survey platform Unipark. The questionnaire started with an informed consent form and only those who agreed to participate were given access. Each participant was randomly assigned to one of the three versions of the questionnaire with a different set of 10 vignettes to evaluate. The questionnaires were otherwise identical. The instruction to the first section read, "Below you will read descriptions of 10 different people living in [Country]. Please evaluate each person using the scales after each description. You need to choose a number on a scale from 1 (Not at all) to 6 (Very much) that best describes your attitude towards a person. There are no right or wrong answers; we are interested in your opinion." Then the set of ten vignettes was presented in a randomized order. The order of the vignette dimensions within each vignette

was kept constant. Examples of vignettes: "A young Bihari woman. She lives in a village. She is Muslim. She belongs to a Scheduled Caste. She studied up to high school and works as a laborer. She has an average income." (India); "An elderly Asian Australian man. He lives in a regional town. He is not religious. He is a native Australian English speaker. He completed vocational training and works as a tradesperson. Financially, he is worse off than the average Australian." (Australia). Three questions were used to measure the attitude towards the vignette person: "I like this person", "I respect this person", and "I want to engage with this person". Liking and respect were aimed at covering the warmth and competence dimensions of perception, and the last question was aimed at behavioral intention for contact. Cronbach's α for this measure varied from .81 to .92 in four countries.

After evaluating the vignettes, participants were asked to provide some background information. All nine dimensions of categorization included in the vignettes were included in this section (see Chapter 4 for measures), to enable us to identify whether the participant and each vignette person evaluated by the participant shared a group membership on each of the dimensions. For each dimension, we coded an observation as an "ingroup", if a participant and a vignette person belonged to the same group on that dimension and as an "outgroup", if they belonged to different groups. All study materials, including the questionnaires, data, and syntax, can be found on the Open Science Framework platform: https://osf.io/2nrbm/?view_only=bd66e92f766446d8b2763de039752ee2.

Participants

We used non-probabilistic quota sampling to represent all the social groups that were included in the vignettes. Two criteria were used to determine the sample size at the country and the group level. For the country level, we followed recommendations of Maas and Hox (Maas & Hox, 2005), who showed in their simulation study that variance components of multilevel models are estimated without bias only when the sample size on the second level

approaches 100. Based on this estimate, each version of the questionnaire should be filled out by 100 participants, thus the desired sample size was 300 participants per country (100 respondents x 3 versions of the questionnaire). For the group level, we followed Auspurg and Hinz (Auspurg & Hinz, 2015), who recommended aiming for at least 5 participants per version of the questionnaire; thus, the desired sample size was at least 15 participants per group.

Participants in Australia, Brazil, and India were recruited from a research panel of a survey company Lightspeed that specializes in digital data collection. The company does not offer panels in Armenia. Data collection in Armenia was conducted by the Turpanjian Center for Policy Analysis at the American University of Armenia. Where online access to participants was not possible, the survey was administered as a computer-assisted personal interview (CAPI). Overall, we sampled 103 groups in four countries; the desired sample size was reached for 100 groups. Total sample size was N = 1281 (N_{AU} = 359, N_{AR} = 311, N_{BR} = 282, N_{IN} = 329). As each participant evaluated ten vignettes, this amounted to $N = 12810$ observations. The sample details are presented in Table 4.1 of Chapter 4.

Results

We employed a two-step mixed methods design to (1) identify the dimensions of social categorization relevant for people's perceptions of each other in a given context and (2) test the effects of these dimensions on attitudes. We briefly present the results of expert interviews that determined our choice of dimensions before turning to the results of the main study.

Expert interviews

Ten to eleven experts on intergroup relations, mainly university professors, were interviewed in each country. They were asked to rank order dimensions of social categorization (selected based on literature) according to their relevance and importance for

people's perceptions of each other in the country and, if needed, to add any other relevant dimensions not mentioned in the list. Intra-class correlation for interrater reliability varied from .66 to .87, with a mean of .76 across four countries. Those dimensions that were found highly relevant in at least two countries were included in the main study in all four countries. These dimensions were gender, age, occupation, education, income, ethnic background (including race), religion, and place of residence (within the country). Dimensions that were highly relevant only in one of the countries were included in the main study as country-specific dimensions. These were English language proficiency in Australia, sexual orientation in Armenia, political views in Brazil, and caste in India. The specific groups to represent these dimensions were selected based on informal interviews with residents of each country (see SM for details on dimension and group selection).

Effects of group memberships on attitude

Participants evaluated vignettes, in which fictitious people were described in terms of their membership groups. Nine categorization dimensions identified in the first step are the independent variables (IV) that are manipulated (vignette dimensions), group memberships on these dimensions are the levels of IVs, and attitude towards the vignette person is the dependent variable. As vignettes are nested within respondents, we used multi-level regression models for all analyses. We coded whether each participant-target pair belong to the same group on each of the dimensions. We then tested the effects of vignette dimensions and coded shared group membership on each dimension on attitudes in each country, controlling for respondent characteristics. Intra-class correlations (ICC) indicated that substantial proportion of variance in attitudes was at the level of individuals: 33% in Armenia (AR), 63% in India (IN), and 64% in Australia (AU) and Brazil (BR). Following recent calls to justify the alpha level used to control the rate of false positive findings (Lakens et al., 2018), we use a stricter alpha level for the main effects in this study. We calculate the alpha

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based on a formula proposed by Good (Good, 1982), which adjusts the alpha level by sample size. The alpha adjusted by the smallest N on the country level (N=282 in Brazil) is 0.030; therefore we used $p < .03$ as evidence for statistical significance of the main effects. We used the conventional alpha of 0.05 for the tests of cross-level interactions, as such tests are considerably more prone to Type II error than the tests of main effects (Mathieu et al., 2012). The country-specific multilevel models predicting attitudes towards the vignette person can be found in tables S2.4.1 – S2.4.4.

Across countries, participants evaluated ingroup members more favorably than outgroup members on the dimensions of religion (AU: $b = .13$, $SE = .03$, $p < .001$; AR: $b = .17$, $SE = .05$, $p < .001$; BR: $b = .20$, $SE = .03$, $p < .001$; IN: $b = .20$, $SE = .04$, $p < .001$), ethnicity (AR: $b = .17$, $SE = .07$, $p = .012$; IN: $b = .07$, $SE = .03$, $p = .006$), gender (AR: $b = .08$, $SE = .04$, $p = .025$), and country-specific dimensions of sexual orientation (AR: $b = .72$, $SE = .07$, $p < .001$) and political views (BR: $b = .27$, $SE = .03$, $p < .001$). All these dimensions are perceived to have low permeability of group boundaries. They are often conceived in essentialist ways, being seen either as biologically determined (gender, ethnicity) or as highly coherent and unified, i.e., entitative groups (religion, sexual orientation and political views) (Haslam et al., 2000)..

As predicted, status-related dimensions did not operate through the mechanism of ingroup favoritism. Ingroup members on the dimensions of education, occupation, and income were not preferred over outgroup members in any of the countries. Participants in all countries evaluated targets with lower levels of education (vs. holding a university degree) more negatively (AU: $b = -.14$, $SE = .03$, $p < .001$; AR: $b = -.10$, $SE = .04$, $p = .026$; BR: $b = -.02$, $SE = .04$, $p = .587$; IN: $b = -.17$, $SE = .04$, $p < .001$). Similarly, unemployed targets were evaluated more negatively than professionals (AU: $b = -.24$, $SE = .03$, $p < .001$; AR: $b = -.75$, $SE = .05$, $p < .001$; BR: $b = -.03$, $SE = .04$, $p = .563$; IN: $b = -.21$, $SE = .04$, $p <$

.001). However, the effect of income showed strong cross-country variability. Participants preferred rich over poor targets in Australia and Armenia (AU: $b = -.12$, $SE = .03$, $p < .001$; AR: $b = -.14$, $SE = .04$, $p = .002$), but poor over rich in Brazil and India (BR: $b = .15$, $SE = .04$, $p < .001$; IN: $b = .10$, $SE = .03$, $p = .003$).

Contextual moderators of the effects of group memberships on attitude

To test our predictions regarding contextual moderators, we pooled the data from all countries into a single dataset. As there were only four countries, we did not treat country as a third level in multilevel models, but instead included it as a fixed effect. Two dummy variables were created to reflect participant's country of residence in high vs. low ACD country and high vs. low inequality country, respectively. The results are presented in Tables S2.5.1 and S2.5.2.

We predicted that in countries with higher acceptance of cultural diversity (ACD) preference for ingroup members on sociocultural dimensions of ethnicity and religion will be weaker compared to countries with lower ACD. Before testing this hypothesis, we tested whether there is significant variation in the slopes of shared group memberships on ethnicity and religion in predicting attitudes across individuals. We find the random slopes for both predictors to have significant variation across individuals ($\sigma^2_{u1} = .003$, $p = .002$ for ethnicity and $\sigma^2_{u1} = .025$, $p < .001$ for religion). The test of cross-level interaction (Fig. 5.1) indicated that participants in countries with higher ACD showed no preference for ethnic ingroup members, whereas participants in countries with lower ACD did ($b = 0.07$, $SE = .03$, $p = .036$). No such effect was observed for religion ($b = -0.06$, $SE = .03$, $p = .077$).
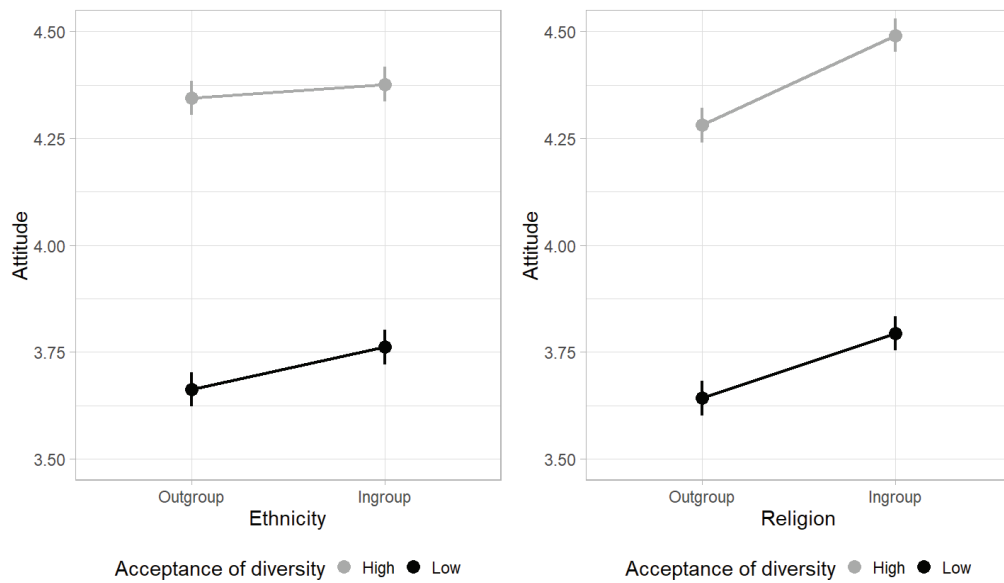
Figure 5.1. Intergroup bias on dimensions of ethnicity and religion as a function of country-level acceptance of cultural diversity

For status-related dimensions, we expected to find a stronger preference for higher status others in countries with lower versus higher levels of inequality. We found significant variation in slopes across individuals for occupation and income, but not for education. Nevertheless, the preference for better-educated targets was observed only in low inequality countries (Fig. 5.2). Participants' own level of education did not moderate this preference (b = .02, SE = .01, p = .07). The cross-level interactions of country-level inequality with occupation and income as predictors of attitudes supported our expectations: countries with lower level of inequality showed stronger preference for higher-status others (Fig. 5.2). For occupation, the largest difference was observed in evaluations of the unemployed targets, who were perceived more negatively in more equal countries (b = .30, SE = .04, p < .001). For income, the level of inequality in the country strongly affected the evaluations of the poor (b = .26, SE = .04, p < .001). In countries with high level of inequality, poor people were preferred over rich, whereas the opposite was true for countries with lower inequality. As in case of education, individuals' own position in the occupational or income hierarchy did not moderate these relationships. There was no interaction between vignette dimensions of

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occupation or income and participants' occupation ($b = -.03$, $SE = .02$, $p = .08$) or income ($b = -.005$, $SE = .01$, $p = .73$).
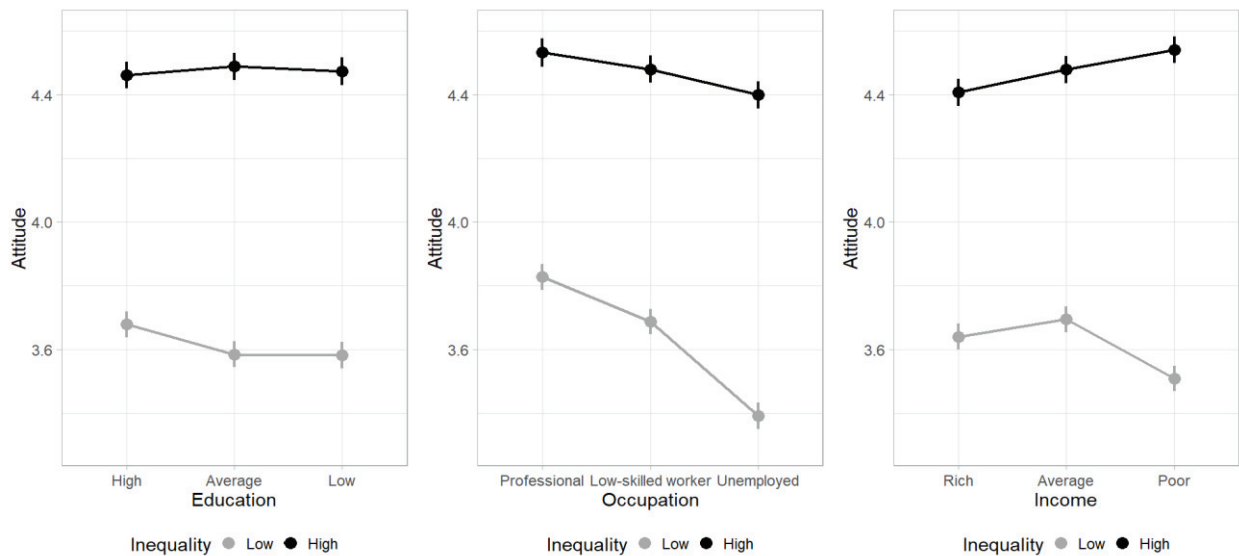
Figure 5.2. Effects of socio-economic dimensions on attitudes as a function of country-level inequality

Discussion

These findings show that the way others' group memberships affect our perception of them depends on the specific group under consideration and the characteristics of our social environment. Ingroup favoritism, traditionally viewed in social psychology as the general principle underlying intergroup attitudes (Hewstone et al., 2002; Henri Tajfel & Turner, 1979), seems to be limited to a certain type of groups. Ingroup favoritism can easily appear in smaller groups that allow direct interaction and shared norms, but when it comes to large social categories, only those groups that are perceived to have clear group boundaries, structure, and meaning produce similar biases.

Different groups, different consequences

Across countries, we found a preference for ingroup members on the dimensions of religion, ethnicity, political views, sexual orientation, and gender. All these groups are commonly perceived in essentialist ways, as being either biologically determined or being

highly entitative (Haslam et al., 2000). Perceived group entitativity, especially when combined with essentialist view of the group, is associated with more prejudice (Agadullina & Lovakov, 2018). From an evolutionary perspective, the preference for the ingroup that is observed on these dimensions can be attributed to sharedness of norms and normative expectations which makes cooperation within groups easier than cooperation between groups (Brewer & Caporael, 2006). The fact that religion, sexual orientation, and political views induced strongest intergroup bias across countries speaks to the importance of the morality dimension in the typology we propose.

Groups that do not provide this sense of shared norms and beliefs do not create similar preference for ingroup members. We show that participants' own group membership on status-related dimensions of education, occupation, and income, did not affect their evaluations of others based on these group memberships. It does not, however, mean that these dimensions are not important for impression formation. They influence attitudes by signaling the position of the individual in a societal hierarchy. How this perceived status will translate into attitudes towards the person depends on the attributions that people make about the status hierarchies in their specific social context.

The role of context: Acceptance of cultural diversity

This study is the first to empirically demonstrate how contextual factors make certain group memberships less or more important in evaluations of others. We find no intergroup bias on the dimension of ethnicity in countries where acceptance of cultural diversity is the societal norm. This finding is in line with Group Norm Theory (Crandall et al., 2002; Paluck, 2009; Sherif & Sherif, 1953), which describes prejudice as a product of socialization. It also corresponds to evidence that individuals living in contexts where people on average have more positive intergroup contact are less prejudiced (Christ et al., 2014). Previous studies demonstrated the effect of normative context of the immediate environment. Our findings

suggest that a broader, country-level, normative context has the power to reduce prejudice as well.

One of the central points of criticism of Group Norm Theory is that norms might reduce the expressions of prejudice, but not personal beliefs (Crandall et al., 2002). The finding that unlike ethnicity, religion showed strong intergroup bias in all four countries challenges this assumption. If participants in countries with higher acceptance of diversity were consciously choosing not to evaluate ingroup members on cultural dimensions more positively, then we would observe a similar effect for religion. However, ingroup membership on the dimension of religion was the strongest or second strongest predictor of attitudes in all countries. What is unique about religion as a social category that it alone showed such universality in predicting attitudes across contexts?

The key function of all major religions is to provide moral guidance and give answers to fundamental questions of existence. These moral regulations are often viewed as "undisputable truths" (Norenzayan & Shariff, 2008; Silberman, 2005, p. 649), leading to an inevitable conclusion that religious outgroups with a different set of beliefs and moral regulations have to be mistaken at least in some respects. It is not surprising, then, that studies of the link between religiosity and intolerance find mixed evidence for attitudes towards ethnic and racial outgroups, whereas attitudes towards religious outgroups are always found to be more negative among religious people (Hunsberger & Jackson, 2005).

The role of context: Inequality

Our findings suggest that context plays an even larger role when it comes to the effects of status-related group memberships on attitudes. The effects of higher status on education and occupation, though positive in most countries, were much stronger in countries with low levels of inequality. The moderating effect of the context was strongest for the dimension of income: in societies with low levels of inequality the rich were evaluated more

positively than the poor, whereas in societies with high levels of inequality the poor were evaluated more positively than the rich.

In countries where inequality is low, social mobility is typically high (more permeable group boundaries) and meritocratic beliefs of higher status being a result of personal abilities and hard work are widespread (legitimacy of status relations). This results in a positive image of better-educated and economically advantaged individuals. For the same reasons, membership in low-status groups is stigmatized and associated with lower self-esteem and well-being (Becker & Tausch, 2014; Major & O'Brien, 2004; Schmitt, Branscombe, Postmes, & Garcia, 2014). As a result, individuals in low-status groups prefer dis-identification with the ingroup (Day & Fiske, 2017; Naomi Ellemers et al., 1988).., Our findings are in line with this reasoning, showing yet another example of the "irony of meritocracy" (Kuppens et al., 2018). When inequality is high, moving up the social ladder proves to be quite difficult. People live in an environment where they observe the children of the rich and powerful becoming rich and powerful, and the children of the poor and disadvantaged being trapped in the cycle of poverty. It is then hard to see the ones on the top as deserving their position; higher status in the societal hierarchy is seen as a matter of luck and connections. In such settings, higher status does not have the same positive connotation as it has in economically more equal societies. This leads to differences we observe, especially in evaluations of the rich, as income is the most direct indicator of power.

Limitations

There are two key limitations to this study that suggest avenues for future research. First, the data are limited to four countries that differ in many ways besides the two dimensions used to select these cases. The fact that we find predicted differences even with these contrast cases approach is promising. However, a larger cross-cultural dataset will be needed to make sure that the differences found cannot be attributed to other country-level

characteristics. Second, the study is limited to attitudes. For example, although we do not find intergroup bias on the dimension of ethnicity in countries with inclusive social norms, it does not yet mean that ethnic discrimination does not exist in these countries. However, attitudes are a crucial psychological antecedent of discriminatory behavior, and finding ways to improve intergroup attitudes is a necessary step on the path to more accepting and less discriminating societies.

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CONCLUSION

The current project built on social cognition and intergroup relations literatures to address two research questions that together contribute to our understanding of attitude formation in situations when information about target's multiple crosscutting group memberships is available. First, we investigated whether the mechanisms of impression formation identified in studies of crossed categorization with two dimensions hold for cases of multiple crosscutting dimensions of social categorization. Second, we studied whether existing theories of intergroup relations that were developed and tested in simple categorization settings explain intergroup bias that occurs in multiple categorization settings. Below we discuss contribution that this dissertation makes to the social cognition and intergroup relations literatures, implications of our findings, as well as limitations of the current project and directions for future research.

Contribution and theoretical implications

Arguably, the most important contribution this study makes is bringing attention to the study of attitude formation in multiple categorization settings. As we outlined in the introduction, psychological research on this topic has been scarce. Despite the increasing urgency of the matter that follows increases in mobility and "diversification of diversity", the number of psychological studies on the topic hardly changed in the last decade. This dissertation offers some new insights, as well as provides a set of methodological tools and theoretical arguments for future research on consequences of belonging to many groups. Below we summarize the key findings of the project and discuss what they contribute to the existing knowledge.

Mechanisms of impression formation in multiple categorization

Traditionally, two contradictory approaches were developed to describe how we form impressions of others. Top-down, gestalt approaches describe impression formation as a

process of assignment of a target to a certain category, from which the characteristics of the target are then inferred (Asch, 1946). Bottom-up approaches describe impression as a result of algebraic strategies of information processing, when pieces of information are integrated to form an image of the target (Anderson, 1965, 1981). Both Brewer's (1988) dual process model of impression formation and Fiske and Neuberg's (1990) continuum model of impression formation aimed at integrating these two approaches into a single theoretical framework. Both models suggest that either top-down or bottom-up approach can be used to form impressions, and which one will dominate depends on perceiver's self-involvement in the perception task, as well as their motivation and attention. Both models propose that if the categorization task proves to be difficult (the target does not easily fit into an existing category), the bottom-up, piecemeal information processing takes place, resulting in individuation instead of category-based judgment.

Our findings contradict the either-or view of bottom-up and top-down information processing strategies that both Brewer's (1988) and Fiske & Neuber's (1990) models represent. In Chapters 2 and 3, we show that even in cases when the target cannot be easily categorized (targets represent eight different groups, with many counter-stereotypical combinations included), stereotypical, schema-based information is still used to make judgments. The contribution of this study to the field of social cognition and, specifically, to the information processing literature, can be summarized in the following three statements. First, when information about target's multiple group memberships is available, bottom-up processing is used. All pieces of information were considered in making the judgments, which is reflected in the fact that all shared group memberships had positive effects on perceived similarity, as reported in Chapter 2, and strong evidence for the additive pattern reported in Chapter 3. Second, perceiver's attention and motivation play a crucial role in impression formation. Various dimensions of categorization contributed unequally to the

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final impression, indicating unequal importance assigned to different pieces of information by the perceiver. Moreover, perceiver's knowledge of own membership groups interacted with target's group memberships in forming judgments, showing a motivational drive in line with SIT predictions. Third, top-down information processing is used simultaneously with bottom-up information processing, as (1) stereotypical knowledge about groups was used in judgments and (2) all judgments were clustered into two broader categories of in-group-like and out-group-like others, replicating results of Urada et al. (2007).

These findings are in line with Information Integration Theory (Anderson, 1988). The IIT is a functional approach to social cognition, which puts assemblage at the center of impression formation. Assemblage is an active process of memory construction, where judgments are formed using diverse sources, including pre-existing knowledge, perceiver's goals, and situational stimuli. Assemblage combines both bottom-up and top-down processing and allows for simultaneous operation of both. Our findings provide strong support for this view of impression formation.

Explaining strength of intergroup bias when many groups are salient

Although the additive pattern of evaluations holds for cases of multiple categorization with as many as eight groups, we do find that some dimensions produce stronger intergroup bias than others in both studies and all five countries. Findings presented in Chapters 4 and 5 contribute to both social cognition and intergroup relations literatures by providing first evidence on determinants of intergroup bias in multiple categorization settings. We show that both individual and contextual variables direct perceivers' attention when they are faced with complex social stimuli.

On the individual level, strength of identification with the group drives perceivers' evaluations: the stronger they identify with the group, the more positively they evaluate ingroup members compared to outgroup members on that dimension. This finding is in line

with the SIT predictions and supports the argument that intergroup bias that arises from identification with groups is mainly driven by the preference for the ingroup rather than hostility towards the outgroup (Balliet et al., 2014; Brewer, 1999). Moreover, it shows the generalizability of the predictive power of SIT to multiple categorization settings, across dimensions of categorization, and across contexts.

Whereas identification seems to be the "pull factor" of intergroup bias, driving preferential treatment of the ingroup, threat can be described as the "push factor", driving negativity towards the outgroup. The predictive power of symbolic threat showed generalizability to multiple categorization settings, predicting more negative attitudes towards outgroups across various dimensions and across contexts. However, in line with earlier studies (Bettencourt et al., 2001; Cadinu & Reggiori, 2002; Riek et al., 2006), it showed limited generalizability across target groups: threat predicted stronger bias only towards lower-status outgroups.

Another significant contribution this work makes is bringing the broader societal context into the study of impression formation. Findings presented in Chapter 5 shed light on how social context factors into cognitive processes underlying impression formation.

We demonstrate that the extent to which societies are open to cultural diversity impacts how information about others' cultural group memberships is processed. Individuals in countries with low acceptance of cultural diversity showed preference for the ethnic ingroup members, whereas those in countries with high acceptance of cultural diversity did not differentiate between ethnic in- and outgroup members. Despite the positive role of inclusive societal norms in reducing ethnic bias, religious bias seems to be more resistant to contextual influences. The group membership on the dimension of religion produced strong intergroup bias in all countries, and this effect was not moderated by the country-level acceptance of diversity. We can suggest at least to possible explanations for this finding. The

humanistic discourse around the topic of cultural diversity might be focusing more on ethnic and racial prejudice and not enough on religion, resulting in the positive effect of acceptance of inclusive norms being limited to ethnicity and race. It could also mean that nature of religious groups is somehow different from ethnic groups, making religious bias less susceptible to change. We will return to this issue in the next section.

Another contextual moderator that was shown to impact impression formation is the level of inequality in the country. We find that the way people draw inferences from others' socio-economic status depends on how equally the resources in the society are distributed. In societies with low inequality, where social mobility is usually high and meritocratic beliefs are widespread, individuals see higher status as a positive indicator. This is evidenced by more positive attitudes towards better educated, better employed, and richer targets. In societies with high inequality, usually accompanied with low social mobility and disbelief in meritocracy, people show less favorable attitudes towards higher-status others. They still draw positive inferences from target's education and occupation, although weaker than those residing in more equal countries, but their attitudes towards the rich are more negative than towards the poor. These findings provide first evidence from the field on how context shapes perceptions of status, supporting earlier findings from laboratory experiments (Day & Fiske, 2017; Ellemers et al., 1988; Ellemers, Wilke, & van Knippenberg, 1993).

Typology of social categories

Across both studies and all five countries investigated, we observed a univocal split between the ways different social categories affected attitudes. Psychology of intergroup relations largely relies on the assumption that the effect of others' social group memberships on attitudes towards them depends on the group memberships of the perceiver. However, number of group memberships included in these studies did not produce any intergroup bias (neither as preference for the ingroup, nor the outgroup). Importantly, the absence of bias

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could not be explained by irrelevance of these group memberships, as they had strong direct effects on attitudes. These effects simply did not depend on the perceiver's own group memberships. The group memberships that operated primarily via the mechanism of ingroup bias were religion, ethnicity, political views, and sexual orientation. The group memberships that did not create intergroup bias but affected attitudes irrespective of perceiver's group memberships were education, occupation, and income.

Social psychologists have introduced number of typologies to classify groups. Lickel et al. (2000) proposed a classification based on perceived group entitativity (the "groupness" of the group). They differentiate between intimacy groups (e.g., family), task groups (e.g., sports team), social categories (e.g., women), and loose associations (e.g., audience at a movie), ordered from high to low entitativity. This classification does not help in understanding the split observed in our studies, as all group memberships considered here belong to the type of social categories. Another classification proposed by Haslam et al. (2000) differentiates between social categories along the dimensions of entitativity and naturalness, both being different ways of essentializing social groups. Group entitativity indicates how closely the members of the group are linked to each other, and naturalness indicates whether there is some defining ('essential') quality that all members of the group share. All groups, memberships in which affected attitudes primarily via intergroup bias (religion, ethnicity, political views, and sexual orientation) would score higher either on one or on both dimensions of essentialism compared to those that did not have an effect on attitudes via this route. However, we argue that this conceptualization of social categories still misses some pieces of the puzzle.

First, we propose an additional dimension that might be key to understanding which types of groups create intergroup bias: the dimension of morality. Our findings provide some initial evidence in support for this argument. Religion was the source of strongest intergroup

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bias in three out of five countries, and second strongest in the remaining two. In these two countries the first position was occupied by political views and sexual orientation. All these groups are strongly linked to certain views on morality. The evolutionary explanation of the emergence of intergroup bias (Brewer & Caporael, 2006) suggests that groups that are well-regulated by common norms, rules, and customs should be more prone to give preferential treatment to ingroup members. Moreover, there is evidence suggesting that morality is more important in positive in-group evaluations than sociability and competence (Leach, Ellemers, & Barreto, 2007). We therefore suggest that two properties of social groups can predict whether or not that group is likely to be a source of intergroup bias: essentialism and moral boundness.

Second, the classification proposed by Haslam et al. (2000) only helps to identify categories that are likely to create intergroup bias. However, it fails to recognize an important role that groups indicating status play in attitude formation. Educational, occupational, and income groups would all score low on essentialism and moral boundness. Nevertheless, they strongly influence our perceptions of others. We propose that this puzzle can be completed by linking typology of group memberships to the two fundamental dimensions of human perception identified in various lines of research: communion (or warmth, interdependence) and agency (or competence, independence). The main function of social categories that are seen in essentialist ways and provide moral regulations is to signal who is a friend and who is a foe. Sharedness of some "essential" qualities, as well as moral views ensures reciprocity and creates trust. The main function of social categories that represent status is to signal the position of an individual within the societal hierarchy, which can be then decoded into expectations of competence and agency. Both pieces of information are fundamental to human functioning and survival, hence both play a crucial role in forming impressions of others.

<center>**Methodological and practical implications**</center>

The contribution of this project is not limited to the theoretical advancements discussed above. The methodological solutions presented in this dissertation can be of use to other researchers interested in the psychology of intergroup relations, attitudes, decision making, lay theories, and more broadly, social cognition. The findings of this study also have significant practical implications, offering ways toward reducing prejudice and discrimination and building more harmonious societies.

Methodological implications

Vignettes have been used in psychological research for a long time, as did factorial experiments. However, factorial survey opens up new possibilities for psychological research. A typical factorial experiment includes two to three independent variables. Algorithms developed to design factorial surveys allow manipulating many independent variables, without loses in the power of the research design or accuracy of estimation. Methodological studies show that the "magical number" of seven plus or minus two applies to factorial designs as well: The greatest consistency in evaluations was observed in designs where five to nine independent variables were manipulated (Auspurg, Hinz, Sauer, & Liebig, 2014; Sauer, Auspurg, Hinz, & Liebig, 2011). This offers considerably more freedom to the researchers interested in complex research questions that require higher number of independent variables to be incorporated in the study design.

Besides the possibility to manipulate a high number of independent variables, factorial surveys have several other benefits that make them especially valuable for the study of social-psychological phenomena. They can be implemented in a survey format, which provides access to broader groups of population and increases ecological validity of studies. Moreover, they are less prone to social desirability effects (Armacost et al., 1991; Auspurg &

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Hinz, 2015), which in many cases will make the use of deception in social-psychological experiments unnecessary.

The studies presented in this dissertation also make a strong case for culture-sensitive approach to social-psychological research. The utility of cross-cultural designs has been repeatedly discussed in psychological literature (Berry, Poortinga, Breugelmans, Chasiotis, & Sam, 2011; Brady et al., 2018; Matsumoto & Van de Vijver, 2011), but cross-cultural studies are still only a small part of the mainstream psychology. Our findings show that whereas predictions from some theories find support across all cultural contexts, predictions from others do not stand the test of cross-cultural generalizability. For example, we find salience of intergroup conflict to have the opposite of the predicted negative effect on the strength of intergroup bias in some contexts. Moreover, this approach allows investigating the interactions between contextual and individual variables in psychological processes, as illustrated in Chapter 5. The interviews we conducted with locals in each country helped to adapt the study design to specific cultural circumstances, which resulted in increased ecological validity. The diversity of the samples recruited showed the generalizability of findings not only across countries, but also across different groups of population within countries. Social psychology still strongly relies on single culture studies. The "social" in "social psychology" can only be unpacked if culture is taken into account.

Practical implications

The findings of these studies suggest new avenues for interventions aimed at prejudice reduction. First of all, knowledge about hierarchies of prejudice, i.e. which dimensions of social categorization cause most hostility and are most divisive, is extremely valuable in making policy decisions regarding where the resources should be directed to most effectively deal with intergroup hostility and discrimination. Ethnic and racial bias received by far the most attention from scientists and policy-makers (e.g., see Fig. 1.2 in the

introduction), and for a good reason. Our findings, however, clearly indicate that religion is a more powerful source of intergroup bias and should receive at least as much attention as ethnic bias.

Existing approaches to prejudice reduction that have received empirical support both from laboratory and field experiments come down to few theoretical ideas. The most researched is the contact (and extended contact) hypothesis. Intergroup contact has been shown to reduce prejudice even when the conditions specified by Allport (common goals, equal status, intergroup cooperation, and institutional support) are not met and even when there is no direct interaction between the members of the groups (Allport, 1954; Miles & Crisp, 2013; Pettigrew & Tropp, 2006). Besides direct and extended contact interventions, several other intervention approaches rely on contact hypothesis, such as cooperative learning or discussion groups. Despite intergroup contact being, so far, the best psychology has to offer to policy-makers, it has important limitations. A recent meta-analysis shows that intergroup contact has much weaker effects on racial, ethnic, and religious prejudice compared to other forms of prejudice and in adult samples compared to student samples (Paluck, Green, & Green, 2018). In addition, contact interventions are often difficult to implement as they require considerable amount of resources.

Another theoretical framework used in prejudice reduction interventions is the group norm theory. The theory suggests that if the norms of the group are changed, this change will be internalized and reflected in individuals' attitudes. Interventions based on entertainment and peer influence that rely on social norms approach proved to be efficient in prejudice reduction (Paluck & Green, 2009). Importantly, these interventions only focused on changing norms in small groups with direct interaction between participants. Our findings suggest that the norms of larger social units, as large as countries, also have the power to reduce prejudice. However, the findings also demonstrate that the effect of inclusive social norms is

limited, as evidenced by religious bias being strong in all countries, irrespective of how inclusive the country's norms are.

The third theoretical approach to prejudice reduction can be summarized as the cognitive approach. This includes various strategies inspired by SIT, such as common in-group identity, crossed categorization, and de- and re-categorization. Our findings are consistent with earlier studies of positive effects of crossed categorization demonstrated in laboratory settings (Crisp, Hewstone, & Rubin, 2001). We take the claim of effectiveness of crossed categorization in reducing intergroup bias a step further, showing supporting evidence for this claim across contexts, with higher number of categorization dimensions, and in a more ecologically valid experimental setup. The evidence suggests that every shared group membership, however insignificant it may seem, has the power to make people see each other as more similar, resulting in more positive attitudes. This simple and straightforward way of improving intergroup attitudes can be implemented in any situation, does not require much resource, and can be used by anyone. Intergroup attitudes can be improved by simply making salient all the ways that we are similar to each other, rather than different from each other.

Limitations

The set of studies presented here is certainly not without limitations. First of all, although the designs of these studies take the investigation of impression formation closer to real-life settings compared to traditional lab experiments, there is still considerable artificiality in presenting other people exclusively through their membership groups. Moreover, we explicitly make a large number of group memberships salient, whereas in real life people will not have immediate access to all that information, and even if they do, only some of these group memberships will be salient. The next logical step in this line of research would be to design studies with actual face-to-face or online interactions to test how much

weight group memberships have in impression formation compared to other individual characteristics and how and why certain dimensions of categorization become more salient than others.

The diversity of the samples recruited is one of the strengths of this work. The choice of non-probabilistic quota sampling enabled us to represent all the groups of interest. However, the sample size for different groups included in the studies varied considerably, which might have slightly biased the results towards the larger subsamples of majority groups. We deliberately chose not to use weighting techniques, as they have been shown to be problematic and even increase bias when used on non-probabilistic samples (Franco, Malhotra, Simonovits, & Zigerell, 2017). The smaller size of some subsamples is another argument against weighting, as if weighted, individual cases within these subsamples would become disproportionately powerful in affecting the estimates. Future studies interested in generalizing the results to broader populations (e.g., country) will benefit from using probability samples. However, if the interest is in generalizability across subgroups of the population, the preference should be given to quota samples with equal representation of minority groups.

Finally, the analysis of societal moderators would be stronger if more countries were incorporated into the sample. The contrast cases approach we used has many benefits, including theoretically driven case selection and feasibility. Given that our predictions were confirmed with this approach also speaks to its utility. However, the case for contextual moderators would be stronger if other alternative explanations could be ruled out. For example, countries included in Study 2 differed not only in acceptance of cultural diversity and inequality, but also in their size and population, level of diversity, GDP per capita, and more. A larger sample of countries would allow controlling for these confounds and making stronger claims about the sources of differences in how group memberships affect attitudes.

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Future directions

This dissertation opens up new avenues for future investigations of impression formation, prejudice, and intergroup relations in the world of "diversifying diversity". As mentioned earlier, the next logical step would be to utilize the benefits of factorial survey designs to study impression formation in face-to-face interactions, using behavioral measures as dependent variables. Such approach would advance our knowledge of how and why certain group memberships are more prone to eliciting intergroup bias, and what are the individual and contextual factors that affect the salience of social categories and their likelihood to lead to prejudice and discrimination.

Another line of research that this approach would be useful for is the study of intersections of various group memberships and the consequences that these intersections have for how people perceive each other. Combinations of some group memberships are more (stereo)typical than others. When thinking about immigrants, the first thing that comes to peoples' minds is usually not a well-educated individual holding a professional job. The first image would probably be of someone who is poor, does not speak the host country's language well, and is earning their living by doing low-skilled work. Now, is the information about someone being a minority group member processed the same way if this person has a high versus low socio-economic status? Do these dimensions interact with each other in any way? These are the questions that were out of the scope of the current investigation, but questions that the datasets presented here can address.

Some of the more specific research questions in this line of thinking would be: How does stereotypicality or counter-stereotypicality of the target's group membership combinations affect the judgments about the target? What combinations of group memberships are considered to be typical or atypical? How do cultural dimensions interact with status dimensions in affecting attitudes towards the target? Does status play a different

role when the target is male versus female? The list can be continued, but to sum up, future studies should go beyond the main effects of group memberships on attitudes and delve deeper into how people form holistic images of others based on the combinations of various group memberships they represent.

The typology of groups proposed in this dissertation could potentially be a valuable tool in predicting why and when certain group memberships become a source of intergroup bias. We suggested that for intergroup bias to occur in large groups, such as social categories, where members cannot possibly have direct interaction with all other group members, certain conditions have to be met. Intergroup bias emerges when the group provides a sense of community, shared norms, values, and beliefs. Groups that provide this sense of community have to have clear boundaries (or at least be perceived as having clear boundaries) and be entitative. However, more importantly, they have to have some ideological basis, providing a set of moral and normative regulations to their members. These assumptions have to be tested in future studies. We could speculate that the morality dimension is the proximal driver of intergroup bias, with definedness of group boundaries being the necessary but not sufficient condition for it to occur. Essentialism could be the consequence of this perceived sharedness of moral grounds. More evidence is needed before we can draw any conclusions regarding the utility of his typology. Nevertheless, evidence provided in this dissertation clearly points to a split between social categories in the ways they operate and affect our perceptions of each other.

Finally, future studies should take a closer look at the potential of cognitive approach to prejudice reduction interventions. Crossed categorization has been shown over and over again to reduce intergroup bias. We show that every shared group membership with another person can improve attitudes towards them. The benefit of crossed categorization over common ingroup identity model is that it does not entail the risk of threatening subordinate

identities that might be of great value to people. Another potential route through which crossed categorization can improve intergroup relations is drawing a more complex picture of the society where groups are not clearly divided along a single or few dimensions. Looking at this from another angle, interventions focusing on increasing social identity complexity could be another highly effective and understudied way to battle prejudice. By learning to acknowledge and find ways to reconcile one's own various (sometimes conflicting) identities, individuals might as well learn to see and acknowledge this complexity in others.

S<small>UPPLEMENTARY MATERIAL</small>

Supplementary information to Study 1

Selection of vignette dimensions and categories

The goal of expert interviews was to identify a set of categorization dimensions that are likely to produce intergroup bias in a given social context. To achieve this goal, we asked eight experts how important the following characteristics are for perceived social distance[12] in Russian context. The list of characteristics included ethnic group, country of birth, citizenship, religion, language, occupation, education, age, and gender in the given order. The list of these characteristics was developed based on the literature review. Gender, age, ethnicity, religion, and education are among the most important sociodemographic characteristics that affect social distance (Smith, McPherson, & Smith-Lovin, 2014). Country of birth, citizenship, language, and occupation were selected based on the relevance of migration issues in the Russian context. Russia is among the top five countries with the largest numbers of international migrants (United Nations, 2017). Attitudes towards immigrants in Russia are generally negative. Data from sociological surveys show that majority of Russians support more restrictive migration policy (80% in 2016; Levada, 2016). Both in ESS and ISSP data, Russia ranks second worst on attitudes towards immigrants among all countries included in these surveys (Bessudnov, 2016; Grigoryan & Ponizovskiy, 2018). As negative attitudes towards immigrants are often explained through their poor knowledge of the Russian language and their low positions in occupational hierarchy (FOM, 2014), we included language and occupation in addition to the more formal characteristics such as citizenship and country of birth.

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[12] The rationale for asking about social distance instead of categorization dimensions was that the term "social distance" would more likely bring to mind those dimensions that are more conflictual and on which people tend to differentiate more.

The experts rated each characteristic on a 5-point scale from 'Absolutely unimportant' to 'Very important'. The highest ratings were given to ethnicity, education, and occupation ($M = 4$), then to language ($M = 3.9$), religion ($M = 3.8$), gender ($M = 3.5$), and age ($M = 3.3$). Citizenship ($M = 2.5$) and country of birth ($M = 2$) were rated as relatively unimportant.

In response to the open-ended question where we asked the experts to name any other important characteristics that were not mentioned in the list, in total 131 responses were given. We grouped these responses into 48 sub-categories and 5 categories. The categories were the following, in order of frequency of mentions: (1) ethno-cultural background, 48 mentions (e.g., 'ethnicity', 'language', 'race', 'similarity of cultures'); (2) appearance and non-verbal cues, 32 mentions (e.g., 'facial features', 'clothing', 'loudness'); (3) social status, 24 mentions (e.g., 'occupation', 'education', 'social status'), (4) social competence/integration, 18 mentions (e.g., 'adherence to norms', 'integration', 'sociability'), (5) religion, 9 mentions.

The majority of these mentions were already covered by the characteristics included in the list (ethnicity; language; religion; education and occupation as indicators of social status). Given the nature of the methodology we used (vignettes describing imaginary people in terms of their group memberships), we could not use characteristics of appearance and non-verbal cues. Although the citizenship and country of birth received relatively low ratings from the experts, when answering the open question, they often talked about characteristics that are usually used when describing migrants, e.g. willingness to integrate, adherence to the norms of the Russian society, cultural similarity, etc. In order to represent this in the vignettes, we included a dimension that combines immigration background with an indication of whether the person immigrated to Russia legally or not. Also, we used the language dimension as an indication of integration: instead of categories that indicate what language the vignette person speaks, we chose categories that describe how well this person speaks

Russian. As a result, we arrived at eight dimensions of categorization that were used in the factorial survey: ethnicity, religion, gender, age, education, knowledge of Russian language, job skill level (occupation), and immigration status.

Vignette setup and coding scheme

Table S1.1. The distribution of factor levels by vignette sets

Vignette factors	Factor levels	% of factor level represented in each set									
		Set 1	Set 2	Set 3	Set 4	Set 5	Set 6	Set 7	Set 8	Set 9	Set 10
Ethnic group	Russian	10	10	10	10	0	10	10	10	10	20
	Tatar	20	10	10	20	10	10	10	10	10	0
	Ukrainian	20	20	20	20	30	20	20	20	20	20
	Bashkir	10	10	10	10	20	20	10	10	10	10
	Armenian	20	20	20	20	20	20	30	30	20	20
	Azerbaijani	20	30	20	20	20	20	20	20	30	30
Religion	Christian	40	30	40	30	30	30	30	30	30	30
	Muslim	30	30	30	30	40	40	30	30	40	40
	Non-believer	30	40	30	40	30	30	40	40	30	30
Gender	Male	50	50	50	50	50	50	50	60	50	60
	Female	50	50	50	50	50	50	50	40	50	40
Age	25 years old	40	30	40	30	30	30	40	30	40	20
	45 years old	30	30	20	30	40	40	30	40	30	40
	65 years old	30	40	40	40	30	30	30	30	30	40
Education	No higher education	30	20	30	20	30	30	30	30	30	20
	Has higher education	40	40	30	40	30	30	30	40	40	30
	Has a PhD	30	40	40	40	40	40	40	30	30	50
Knowledge of Russian language	Almost does not speak Russian	20	30	20	20	20	20	20	20	20	20
	Speaks Russian, but not well	40	30	30	30	40	40	40	30	30	40
	Speaks Russian fluently	40	40	50	50	40	40	40	50	50	40
Job skill level	Low-skilled worker	40	30	30	40	30	40	30	40	40	50
	Skilled professional	40	40	40	30	40	40	30	30	40	30
	Highly skilled specialist	20	30	30	30	30	20	40	30	20	20

Immigration status	Illegally immigrated to Russia	20	30	20	30	20	20	30	20	20	30
	Legally immigrated to Russia	20	30	30	20	30	20	20	30	30	20
	Was born in Russia	60	40	50	50	50	60	50	50	50	50

Note on the D-efficiency coefficient

The power of an experimental design is the amount of statistical information that it is able to provide. To maximize the statistical information, the variance and covariance of estimates (e.g., regression coefficients) should be minimized. Fischer information matrix (FIM) is a commonly used measure of statistical information. D-efficiency coefficient relies on FIM to estimate orthogonality and level balance of an experimental design. The formula for this coefficient is presented below.

$$\text{D} - \text{efficiency} = 100 \times \frac{1}{N_D \, |(X'X)^{-1}|^{1/p}}$$

X is a vector of the vignette variables, $X'X$ represents the matrix, and $|X'X|$ is the determinant of this matrix. N_D is the number of sampled vignettes (usually identified by the researcher in advance), and p is the number of regression coefficients (including the intercepts and any interactions specified) that need to be identified. D-efficiency values should be used not as absolute measures, but rather to compare relative efficiency of various designs. SAS software uses an algorithm that generates thousands of different designs that satisfy the initial specification (number of dimensions, levels, and vignettes) and then selects the one with the best efficiency. The syntax used to produce the current design can be found in the OSF repository. For further information on design efficiency see Auspurg & Hinz, 2015; Duelmer, 2007; Kuhfeld, 2005.

Table S1.2. The coding scheme and number of observations for ingroup/outgroup division

	Ingroup			Outgroup		
	Vignette's characteristic	Respondent's characteristic	N_o	Vignette's characteristic	Respondent's characteristic	N_o
Ethnicity	Russian	Russian	213	Russian	Tatar	53
					Ukrainian	38
					Bashkir	87
					Armenian	71

	Ingroup			Outgroup		
	Vignette's characteristic	Respondent's characteristic	N_o	Vignette's characteristic	Respondent's characteristic	N_o
	Tatar	Tatar	64	Tatar	Azerbaijani	35
					Russian	226
					Ukrainian	40
					Bashkir	98
					Armenian	88
	Ukrainian	Ukrainian	80	Ukrainian	Azerbaijani	51
					Russian	449
					Tatar	119
					Bashkir	202
					Armenian	162
	Bashkir	Bashkir	110	Bashkir	Azerbaijani	103
					Russian	250
					Tatar	63
					Ukrainian	43
					Armenian	88
	Armenian	Armenian	165	Armenian	Azerbaijani	56
					Russian	440
					Tatar	120
					Ukrainian	82
					Bashkir	197
	Azerbaijani	Azerbaijani	94	Azerbaijani	Azerbaijani	97
					Russian	480
					Tatar	117
					Ukrainian	82
					Bashkir	207
					Armenian	166
	Total N		726	Total N		4310
Religion	Christian	Christian	753	Christian	Muslim	482
					Not religious	311
					Other	69
	Muslim	Muslim	522	Muslim	Christian	790
					Not religious	332
					Other	72
	Not religious	Not religious	329	Not religious	Christian	786
					Muslim	519
					Other	71
	Total N		1604	Total N		3432
Gender	Male	Male	963	Male	Female	1640
	Female	Female	1523	Female	Male	910
	Total N		2486	Total N		2550
Age	25 years old	≤ 35	1377	25 years old	36 – 55	263
					≥ 56	40
	45 years old	36 – 55	270	45 years old	≤ 35	1329
					≥ 56	46

	Ingroup			Outgroup		
	Vignette's characteristic	Respondent's characteristic	N_o	Vignette's characteristic	Respondent's characteristic	N_o
	65 years old	≥ 56	44	65 years old	≤ 35	1396
					36 – 55	271
	Total N		1691	Total N		3345
Education[1]	No higher education	No higher education	120	No higher education	Has higher education	1235
	Has higher education / Has a PhD	Has higher education / Has a PhD	3365	Has higher education / Has a PhD	No higher education	316
	Total N		3485	Total N		1551
Language proficiency[2]	Almost does not speak Russian	Poor knowledge of Russian	4	Almost does not speak Russian	Russian is the mother tongue	743
					Fluent in Russian	288
					Limited knowledge of Russian	20
	Speaks Russian, but not well	Limited knowledge of Russian	38	Speaks Russian, but not well	Russian is the mother tongue	1245
					Fluent in Russian	477
					Poor knowledge of Russian	8
	Speaks Russian fluently	Russian is the mother tongue / Fluent in Russian	2163	Speaks Russian fluently	Limited knowledge of Russian	42
					Poor knowledge of Russian	8
	Total N		2205	Total N		2831
Job skill level[1]	Low-skilled worker	Low-skilled worker	148	Low-skilled worker	Skilled professional / Highly skilled specialist	1651
	Skilled professional / Highly skilled specialist	Skilled professional / Highly skilled specialist	2856	Skilled professional / Highly skilled specialist	Low-skilled worker	250
	Total N		3004	Total N		1901
Immigration status[3]	Was born in Russia	Citizen	2362	Was born in Russia / Illegally immigrated to Russia	Non-citizen	311

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	Ingroup			Outgroup		
	Vignette's characteristic	Respondent's characteristic	N_o	Vignette's characteristic	Respondent's characteristic	N_o
	Legally immigrated to Russia	Non-citizen	108	Legally immigrated to Russia / Illegally immigrated to Russia	Citizen	2255
	Total N		2470	Total N		2566

*Notes.*1. In cases of education and job skill level we combined the two higher status categories, as the results demonstrated that the differences in evaluations between those categories are relatively small.

For education, category "No higher education" includes respondents who reported complete or incomplete secondary education or vocational training, and category "Has higher education / Has a PhD" includes those who reported incomplete (students) or complete higher education and those who reported having PhD.

For job skill level the answers to an open-ended question were coded into two categories. "Low-skilled workers" category includes mainly service workers (hairdressers, mechanics, cooks, workers, etc.), and the mixed "Skilled professional / Highly skilled specialist" category includes all the professionals (engineers, healthcare professionals, teachers, academics, students, etc.).

2. In case of language the divide was based on two characteristics of respondents: whether Russian was reported as mother tongue or not, and the self-assessment of Russian language proficiency.

3. As it would not be ethical to ask how exactly the respondent immigrated to Russia, the divide was made based on citizenship, treating "illegal immigrants" as outgroup members for both citizens and non-citizens.

Supplementary information to Study 2

Selection of Vignette Dimensions

To select the relevant dimensions of categorization, we interviewed experts on intergroup relations from each of the four countries. The interviews were conducted online via Unipark survey platform. Experts were asked to rank order the dimensions according to their relevance and importance for people's perceptions of each other in the country and to add any other relevant dimensions, if they were not mentioned in the list. Interrater reliability was assessed using intra-class correlation (ICC) coefficient, which is the preferable estimate for ordered data that was evaluated by multiple experts (Denham, 2017). After calculating the mean rank scores for each dimension in each country, we used contrasts in repeated measures ANOVA to determine the cutoff for inclusion of dimensions. The rank of each dimension

was compared to the rank of the first (most important) dimension using simple comparisons. The dimensions were dropped starting with the least important one till the one that did not differ significantly from the first one. Below we present the results for each country.

Australia. We interviewed 11 experts, from 30 to 59 years old (M = 46.1, SD = 9.5), 6 female. Disciplinary backgrounds: 8 psychologists, 2 sociologists, 1 – social sciences (multidisciplinary). Three of them were university lecturers, two were professors, and others identified as academics. Intra-class correlation (ICC) was 0.68. Ethno-cultural background, race, English language proficiency, gender, occupation, income, and age were ranked as most important dimensions of categorization (Table S2.1.1). Other suggested dimensions were: "Speaking English with Australian accent" – 2 experts, "Asylum seekers" – 1 expert, "Muslim vs. non-Muslim" – 1 expert, "Racist vs. not" – 1 expert, "Drug addict" – 1 expert.

Table S2.1.1. Mean ranks of importance of categorization dimensions in Australia.

Rank	Dimension	Mean rank	Contrasts	
			F (df)	p
1	Ethno-cultural background	4.09	Reference	
2	Race	4.73	.212	.655
3	English language proficiency	5.64	1.26	.288
4	Gender	6.82	1.62	.232
5	Occupation	7.64	4.11	.070
6	Income	7.82	6.42	.030
7	Age	8.27	3.49	.091
8	Mother tongue	8.82	6.57	.028
9	Migration status	9.00	11	.008
10	Ability/disability	9.36	6.76	.026
11	Sexual orientation	9.64	11.63	.007
12	Education	9.82	9.91	.010
13	Political views	10.18	24.75	.001
14	Religion	10.36	18.17	.002
15	Place of residence	11.18	32.36	< .001
16	Citizenship	12.64	28.82	< .001

Note. Included dimensions are in grey.

Armenia. We interviewed 10 experts, from 25 to 64 years old (M = 39.1, SD = 10.4), 7 female. Disciplinary backgrounds: 2 psychologists, 3 sociologists, 1 political scientist, 4 – social sciences (multidisciplinary). Five of them were university professors, 3 were researchers, and 2 worked in NGOs focusing on issues of discrimination. ICC = 0.66. The most important dimensions were income, place of residence, occupation, gender, age, sexual orientation, education, ethno-cultural background, religion, and ability/disability (Table S2.1.2). Other suggested dimensions were: "Marital status ((not) being married, (not) having children)" – 2 experts, "Social capital/network" – 2 experts, "Subjective trustworthiness" – 1 expert, "Subculture" – 1 expert, "Gender identity" – 1 expert, "Progressive/liberal vs. traditional values and beliefs" – 1 expert, "Region of origin within country" – 1 expert, "Place of origin outside the country" – 1 expert, "Social status (beyond the level of income)" – 1 expert.

Table S2.1.2. Mean ranks of importance of categorization dimensions in Armenia.

Rank	Dimension	Mean rank	Contrasts	
			F (df)	p
1	Income	5.10	Reference	
2	Place of residence within the country	5.30	.01	.922
3	Occupation	5.40	.06	.806
4	Gender	6.10	.34	.576
5	Age	7.20	1.88	.203
6	Sexual orientation	7.50	.92	.361
7	Education	7.90	3.72	.086
8	Ethno-cultural background	8.40	1.45	.259
9	Religion	8.50	2.49	.149
10	Ability/disability	8.70	2.61	.140
11	Political views	9.10	28.8	< .001
12	Migration status	10.20	3.63	.089
13	Mother tongue	11.20	20.06	.002
14	Citizenship	11.60	9.17	.014
15	Race	11.60	6.83	.028
16	Armenian language proficiency	12.20	21.11	.001

Note. Included dimensions are in grey.

Brazil. We interviewed 10 experts, from 21 to 71 years old (M = 41.5, SD = 16.3), 3 female. Disciplinary backgrounds: all are psychologists. Eight experts were university professors and two were PhD students in social psychology. ICC = 0.87. The most important dimensions were income, race, occupation, education, place of residence, gender, age, ethno-cultural background, and political views (Table S2.1.3). Other suggested dimensions were: "Social class (a mixture of income, education, family name, place of residency and occupation, similar to casts in India, but no religion involved)" – 1 expert, "Subculture (cultural/musical interests)" – 1 expert.

Table S2.1.3. Mean ranks of importance of categorization dimensions in Brazil.

Rank	Dimension	Mean rank	Contrasts F (df)	p
1.	Income	3.70		Reference
2.	Race	5.00	1.77	.217
3.	Occupation	5.50	1.45	.260
4.	Education	5.70	2.46	.151
5.	Place of residence	5.80	1.80	.213
6.	Gender	6.60	3.07	.114
7.	Age	7.00	3.08	.113
8.	Ethno-cultural background	7.20	6.96	.027
9.	Political views	8.10	4.70	.058
10	Religion	8.60	8.10	.019
11	Sexual orientation	9.30	9.65	.013
12	Ability/disability	11.80	20.16	.002
13	Portuguese language proficiency	12.10	27.56	.001
14	Migration status	12.60	95.18	< .001
15	Citizenship	13.50	85.07	< .001
16	Mother tongue	13.50	96.47	< .001

Note. Included dimensions are in grey.

India. We interviewed 10 experts, from 29 to 58 years old (M = 41.5, SD = 11.5), 4 female. Disciplinary backgrounds: 8 psychologists, 1 sociologist, 1 historian. Seven of them were university lecturers/assistant professors, two identified as academics, and one as researcher/consultant. ICC = 0.83. The important dimensions were gender, religion,

occupation, income, education, and ethno-cultural background (Table S2.1.4). Other

suggested dimensions were: "Caste" – 8 experts, "Urban vs. rural" – 1 expert.

Table S2.1.4. Mean ranks of importance of categorization dimensions in India.

Rank	Dimension	Mean rank	Contrasts	
			F (*df*)	*p*
1	Gender	3.80	*Reference*	
2	Religion	4.10	.081	.782
3	Occupation	4.70	.44	.525
4	Income	4.90	.46	.513
5	Education	7.20	3.13	.111
6	Ethno-cultural background	7.60	4.86	.055
7	Place of residence	7.90	8.96	.015
8	Mother tongue	8.30	9.09	.015
9	Race	9.20	8.19	.019
10	English language proficiency	9.90	14.5	.004
11	Sexual orientation	10.10	24.12	.001
12	Age	10.20	41.7	< .001
13	Ability/disability	10.60	23.17	.001
14	Political views	11.00	26.57	.001
15	Migration status	13.20	61.93	< .001
16	Citizenship	13.30	42.19	< .001

Note. Included dimensions are in grey.

Integration. We combined the dimensions that were ranked high on importance in

each country. Table S2.1.5 presents the list of categories that fully or partially overlapped

across countries. From those dimensions that were mentioned in the open-ended question, we

included ones that were mentioned by at least third of experts (3 or more mentions). This was

the case only with caste in India. All dimensions that were found important in at least two

countries were included in the main study. Race and ethno-cultural background were

incorporated into a single dimension, as they only differ in what specific groups should be

used to represent the dimension (e.g., race in Brazil, ancestry in Australia, ethnicity in

Armenia, ethno-linguistic groups in India). Thereby eight dimensions were used in all four

countries: occupation, income, gender, ethno-cultural background, age, education, place of

residence, and religion. Additionally, we included a country-specific dimension that was

found important only in one of the countries. These were English language proficiency in

Australia, political views in Brazil, and caste in India. In Armenia, two dimensions were

found important in addition to the set included in all countries. For the purposes of

methodological comparability, we aimed at keeping the number of dimensions equal across

countries, therefore only sexual orientation was included in Armenia, as it was ranked as

more important than the ability/disability dimension.

Table S2.1.5. The overlap in categorization dimensions found important across four
countries.

	Australia	Armenia	Brazil	India
Fully overlapping	Occupation Income Gender Ethno-cultural background	Occupation Income Gender Ethno-cultural background	Occupation Income Gender Ethno-cultural background	Occupation Income Gender Ethno-cultural background
Partially overlapping (3/4)	Age	Age Education	Age Education	Education
Partially overlapping (2/4)	Race	Place of residence Religion	Race Place of residence	Religion
Unique	English language proficiency	Sexual orientation, Ability/disability	Political views	Caste

Selection of Categories

To determine which categories will be most appropriate for each country, we

additionally conducted two to four informal interviews with residents of each country.

Additionally, the interviews helped us to decide which combinations of group memberships

are too implausible to elicit meaningful responses from participants. The highly unlikely

combinations were excluded when setting up the vignette study.

For demographic dimensions, age and gender, we used identical categories across

countries. For age it was "young", "middle-aged", and "elderly", to avoid making

assumptions about which age represents these categories, as this may vary across cultures.

For gender it was "male" and "female". For income, occupation, and education the conceptual categories were always "high", "average", and "low", but the specific labels used in different countries were tailored to match the typical instances of these categories in each context. For example, in Armenia, a country where primary and secondary school are obligatory, the lowest level of education was represented by "Completed high school", and in India, where this is not the case, the same category was represented by "Studied up to primary school".

We used the following criteria for selecting ethnic and religious groups: (1) all groups should be represented within the country; as we did not have migration background as a dimension, we only included those groups that were residing in the country for a considerable amount of time; (2) in each country, the "majority" or the "dominant" ethnic and religious group was always included, and the two other categories represented two minority groups with relatively high and relatively low status. For example in Australia, the dimension of ethnicity was represented by European Australian (the "dominant" group), Asian Australian (minority group with relatively high status) and Aboriginal Australian (minority group with relatively low status). In India, the selection of ethno-linguistic groups was more difficult, as there is no single "majority" or "dominant" group in the country on this dimension. The selection was based on representation of two broadly defined cultural regions in the country: North (Indo-Aryan languages) and South (Dravidian languages). As the Indo-Aryan linguistic group is larger, we selected two groups representing this category (Bihari and Bengali) and one group representing the Dravidian linguistic group (Tamil).

In case of religion, the dominant group was represented by the most widespread religion in the country (e.g., "Christian" in Australia and Armenia, "Catholic" in Brazil, "Hindu" in India), the minority group with relatively low status was always the second largest religion in the country ("Muslim" in Australia and India, "Yazidi" in Armenia,

"Evangelical" in Brazil). The category of relatively high status minority group was represented by "not religious" in all countries. The categories used for the vignettes in each country are presented in Tables S2.2.1 to S2.2.4.

Certain combinations of group memberships were considered highly implausible in three out of four countries. Two combinations were excluded as highly implausible in Armenia: interviewees indicated that ethnic Armenians and Russians cannot belong to Yazidi religious group, thus the combinations of this religious group membership and the two ethnic group memberships were excluded. The interviewees in Brazil indicated that all status-related dimensions were strongly interdependent in Brazilian society. Specifically, a person who is described as having a professional job could not have got to that position without higher education (thus, combinations of being a skilled professional and having low or average level of education were excluded) and cannot be poor (thus, the combination of being a skilled professional and poor were excluded). Similarly, someone who is a low-skilled worker cannot be rich. Thus, four combinations were excluded in Brazil. Finally, two group combinations were considered highly implausible in India: having a professional job and low level of education (up to primary school) and being a laborer and being rich. These two combinations were excluded[13]. None of the combinations of group memberships were considered highly implausible in Australia.

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[13] Due to computational error, instead of excluding the combination of being a laborer and being rich, the combination of being a laborer and being poor was excluded. However, the correlation between these two dimensions was only r = .18 in the vignette setup and r = .16 in the dataset. Additionally, the two dimensions had opposing effects on attitudes, so it is unlikely that this affected the findings of the study.

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Table S2.2.1. Dimensions and categories used in Australia.

Dimension	Categories		
	1	2	3
Age	Young	Middle-aged	Elderly
Ethnicity	European Australian	Asian Australian	Aboriginal Australian
Gender	Female	Male	
Place of residence	Capital city	Regional town	Country Australia
Religion	Christian	Muslim	Not religious
English language proficiency	Is a native Australian English speaker	Is fluent in English, but doesn't sound Australian	Has difficulty speaking English
Education	Has a university degree	Completed vocational training	Left school before completing Year 12
Occupation	Has a professional job	Works as a tradesperson	Unemployed
Income	Better off than the average Australian	On a par with the average Australian	Worse off than the average Australian

Note. For the country-specific dimension of English language proficiency we incorporated the comment made by two experts regarding the importance of Australian accent. Thereby we differentiated between "native Australian English speaker" and "fluent in English, but doesn't sound Australian".

Table S2.2.2. Dimensions and categories used in Armenia.

Dimension	Categories		
	1	2	3
Age	Young	Middle-aged	Elderly
Ethnicity	Armenian	Yazidi	Russian
Gender	Female	Male	
Place of residence	Yerevan	Regional town	Villager
Religion	Christian	Yazidi	Not religious
Sexual orientation	Heterosexual		Homosexual
Education	Has a university degree	Attended college	Completed high school
Occupation	Skilled professional	Low-skilled worker	Unemployed
Income	Is wealthy	Has an average income for Armenia	Is poor

Note. The country-specific dimension of sexual orientation was represented by two categories: heterosexual and homosexual. Discussions around the topic of sexual orientation are very recent in Armenia, so this is still a sensitive topic and many people do not know much about it. To avoid misinterpretation, the label "heterosexual" was not used in the vignettes; by default, this is the assumption people make. Moreover, we oversampled the vignettes representing heterosexual

orientation (2:1) to avoid negative reactions to the questionnaire and to do not create an impression that the focus of the study was on sexual orientation.

Table S2.2.3. Dimensions and categories used in Brazil.

Dimension	Categories		
	1	2	3
Age	Young	Middle-aged	Elderly
Ethnicity	White	Black	Mixed race
Gender	Female	Male	
Place of residence	Capital city	Regional town	Village
Religion	Catholic	Evangelical	Not religious
Political views	Apolitical	Supports the right	Supports the left
Education	Has a university degree	Completed high school	Completed primary school
Occupation	Skilled professional	Low-skilled worker	Unemployed
Income	Rich	Has an average income	Poor

Note. The country-specific dimension of political orientation was represented by broad categories of right vs. left political self-placement. Considering that according to WVS data, the majority of Brazilians identify as "Apolitical", this was chosen as the third category.

Table S2.2.4. Dimensions and categories used in India.

Dimension	Categories		
	1	2	3
Age	Young	Middle-aged	Elderly
Ethnicity	Bihari	Bengali	Tamil
Gender	Female	Male	
Place of residence	Capital city	Regional town	Village
Religion	Hindu	Muslim	Not religious
Caste	Forward Caste	Scheduled caste	OBC
Education	Has a university degree	Studied up to high school	Studied up to primary school
Occupation	Professional	Laborer	Unemployed
Income	Rich	Has an average income	Poor

Note. We had two alternative classifications that could be used for the country-specific dimension of caste. The first was the traditional Varnas (Brahmins, Kshatriyas, etc.) that represent occupational classes and are commonly used among the Hindu population of India. However, this classification is

not applicable to the Muslim population of the country and we needed to select categories that can be combined with other dimensions. The second option was to use the official classification used by the Government of India to acknowledge the disadvantaged groups within the country. The official classification can be applied to all Indian population, so this was the preferred option. This classification differentiates between Forward caste, the group that is not considered disadvantaged or discriminated against and does not qualify for affirmative action schemes. Scheduled castes or scheduled tribes are the group of people who have historically been discriminated. This group is mainly comprised of people who were previously referred to as "Untouchables" and are currently often referred to as Dalits. Finally, the third category is Other Backward Class (OBC), which includes other disadvantaged groups, such as Shudra class from the traditional Hindu caste system.

Vignette Setup

Table S2.3. Distribution of factor levels by vignette sets.

Vignette factors	Australia Factor levels	Set 1	Set 2	Set 3	Armenia Factor levels	Set 1	Set 2	Set 3	Brazil Factor levels	Set 1	Set 2	Set 3	India Factor levels	Set 1	Set 2	Set 3
Age	Young	4	3	3	Young	4	4	3	Young	3	3	4	Young	3	3	4
	Middle-aged	3	3	3	Middle-aged	3	3	4	Middle-aged	4	4	2	Middle-aged	3	4	3
	Elderly	3	4	4	Elderly	3	3	3	Elderly	3	3	4	Elderly	4	3	3
Ethnicity	European Australian	3	3	3	Armenian	3	3	3	White	3	3	3	Bihari	3	4	3
	Asian Australian	3	3	4	Yazidi	4	5	4	Black	4	3	4	Bengali	3	4	3
	Aboriginal Australian	4	4	3	Russian	3	2	3	Mixed race	3	4	3	Tamil	4	2	4
Gender	Female	5	5	6	Female	5	5	6	Female	6	5	5	Female	5	5	5
	Male	5	5	4	Male	5	5	4	Male	4	5	5	Male	5	5	5
Place	Capital city	3	3	3	Yerevan	3	3	3	Capital city	3	3	4	Capital city	3	3	4
	Regional town	4	3	3	Regional town	3	4	4	Regional town	4	3	3	Regional town	4	4	2
	Country Australia	3	4	4	Village	4	3	3	Village	3	4	3	Village	3	3	4
Religion	Christian	3	3	3	Christian	4	4	3	Catholic	4	3	4	Hindu	3	3	4
	Muslim	3	3	4	Yazidi	2	2	2	Evangelical	3	4	3	Muslim	4	3	3
	Not religious	4	4	3	Not religious	4	4	5	Not religious	3	3	3	Not religious	3	4	3
Country-specific	Native Australian English speaker	3	3	3	Heterosexual	7	7	7	Apolitical	4	3	3	Forward Caste	3	3	4
	Fluent in English, but doesn't sound Australian	4	3	4	Homosexual	3	3	3	Supports the right	3	4	3	Scheduled caste	3	4	3
	Has difficulty speaking English	3	4	3					Supports the left	3	3	4	OBC	4	3	3

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Attribute	Level				Level				Level				Level				Level			
Education	Has a university degree	3	3	4	Has a university degree	3	3	3	Has a university degree	4	4	3	Has a university degree	3	3	3	Has a university degree	3	2	4
	Completed vocational training	3	3	3	Attended college	4	4	3	Completed high school	3	3	3	Studied up to high school	4	3	4	Studied up to high school	4	5	3
	Left school before completing Year 12	4	4	3	Completed high school	3	3	4	Completed primary school	3	3	4	Completed primary school	3	3	3	Studied up to primary school	3	3	3
Occupation	Has a professional job	3	4	3	Skilled professional	3	3	3	Skilled professional	2	2	3	Professional	3	3	3	Professional	3	3	3
	Works as a tradesperson	3	3	3	Low-skilled worker	4	4	3	Low-skilled worker	3	3	3	Low-skilled worker	4	3	3	Laborer	3	3	3
	Unemployed	4	3	4	Unemployed	3	3	4	Unemployed	5	5	4	Unemployed	3	5	4	Unemployed	4	4	4
Income	Better off than the average Australian	3	3	3	Rich	3	4	4	Rich	3	3	4	Rich	3	3	4	Rich	4	4	4
	On a par with the average Australian	3	4	3	Has an average income	4	3	3	Has an average income	4	3	3	Has an average income	4	3	3	Has an average income	3	3	3
	Worse off than the average Australian	4	3	4	Poor	3	3	3	Poor	3	4	3	Poor	3	4	3	Poor	3	3	3
D-efficiency coefficient (SE)	98.02 (0.77)				94.7 (0.77)				92.55 (0.77)				94.7 (0.77)				95.6 (0.77)			

Country-specific mixed models predicting attitudes towards the vignette person

Table S2.4.1. Fixed and random effect estimates for models predicting attitudes towards a vignette person from vignette and participant characteristics in Australia.

Parameter	Model 1			Model 2			Model 3		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
				Fixed effects					
Intercept	4.41	0.06	<.001	4.24	0.08	<.001	4.46	0.22	< .001
Level 1 (Within-Persons)									
Vignette dimensions									
Age: Young	Ref.								
Age: Middle–aged	0.04	0.03	.185	0.01	0.03	.628	0.02	0.03	.545
Age: Elderly	0.05	0.03	.061	0.05	0.03	.078	0.05	0.03	.072
Gender: Female	Ref.								
Gender: Male	-0.07	0.02	<.001	-0.07	0.02	<.001	-0.07	0.02	.002
Ethnicity: European Australian	Ref.								
Ethnicity: Asian Australian	-0.04	0.03	.103	-0.02	0.03	.470	-0.03	0.03	.415
Ethnicity: Aboriginal Australian	0.02	0.03	.370	0.03	0.03	.296	0.03	0.03	.442
Place: Capital city	Ref.								
Place: Regional town	0.06	0.03	.032	0.06	0.03	.019	0.06	0.03	.036
Place: Village	0.04	0.03	.178	0.05	0.03	.082	0.04	0.03	.135
Religion: Christian	Ref.								
Religion: Muslim	-0.34	0.03	<.001	-0.28	0.03	<.001	-0.30	0.03	< .001
Religion: Not religious	-0.05	0.03	.034	-0.05	0.03	.043	-0.05	0.03	0.058
Language: Native Australian	Ref.								
Language: Fluent non–native	0.02	0.03	.404	0.02	0.03	.514	0.02	0.04	.555
Language: Not fluent	-0.12	0.03	<.001	-0.12	0.04	.001	-0.12	0.04	.003
Education: University	Ref.								
Education: Vocational	-0.04	0.03	.135	-0.05	0.03	.092	-0.04	0.03	.174
Education: High school	-0.14	0.03	<.001	-0.13	0.03	.000	-0.13	0.03	< .001
Occupation: Professional	Ref.								
Occupation: Tradesperson	-0.04	0.03	.120	-0.04	0.03	.127	-0.04	0.03	.174
Occupation: Unemployed	-0.24	0.03	<.001	-0.21	0.03	< .001	-0.22	0.03	< .001
Income: Above average	Ref.								
Income: Average	-0.001	0.03	.967	-0.003	0.03	.911	-0.01	0.03	.839
Income: Below average	-0.12	0.03	<.001	-0.12	0.03	< .001	-0.12	0.03	< .001
Shared group membership									
Age (ingroup)				0.05	0.02	.047	0.05	0.03	.064
Gender (ingroup)				0.02	0.02	.276	0.03	0.02	.236
Ethnicity (ingroup)				0.04	0.03	.226	0.04	0.03	.238
Place (ingroup)				0.03	0.02	.280	0.02	0.02	.535
Religion (ingroup)				0.15	0.02	< .001	0.13	0.03	< .001
Language (ingroup)				0.003	0.03	.938	-0.0004	0.04	.991
Education (ingroup)				0.03	0.02	.150	0.03	0.02	.272
Occupation (ingroup)				0.05	0.03	.047	0.05	0.03	.036

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Parameter	Model 1			Model 2			Model 3		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
Income (ingroup)				0.003	0.02	.909	0.001	0.02	.963
Level 2 (Between-Persons)									
Age: Young	Ref.								
Age: Middle–aged							-0.04	0.15	.769
Age: Elderly							0.02	0.18	.899
Gender: Female	Ref.								
Gender: Male							-0.16	0.10	.115
Ethnicity: European Australian	Ref.								
Ethnicity: Asian Australian							-0.37	0.22	.089
Ethnicity: Aboriginal Australian							-0.26	0.14	.070
Place: Capital city	Ref.								
Place: Regional town							0.01	0.11	.939
Place: Village							0.08	0.16	.610
Religion: Christian	Ref.								
Religion: Muslim							0.19	0.28	.488
Religion: Not religious							-0.09	0.10	.365
Language: Native Australian	Ref.								
Language: Fluent non–native							0.30	0.16	.056
Language: Not fluent							-0.18	0.40	.660
Education: University	Ref.								
Education: Vocational							0.13	0.12	.278
Education: High school							0.22	0.16	.168
Occupation: High-skilled	Ref.								
Occupation: Low-skilled							-0.11	0.11	.305
Occupation: Unemployed							0.35	0.31	.267
Income: Above average	Ref.								
Income: Average							-0.09	0.14	.513
Income: Below average							-0.26	0.15	.096
Random parameters									
Intercept (Between-Persons)	.762	.87		.764	.87		.708	.84	
Residual (Within-Persons)	.386	.62		.380	.62		.380	.62	
AIC	7900.1			7869.7			7575.8		
BIC	8023.9			8049.1			7858.5		
logLikelihood	-3930.1			-3905.9			-3741.9		
Marginal R^2	.039			.043			.090		
Conditional R^2	.677			.682			.682		

Note. Empty model: AIC = 8266.1, BIC = 8284.7, logLikelihood = -4130.1. Intercept variance = .759 (.87), residual variance = .437 (.66), ICC = .635.

Marginal R^2 = proportion of variance explained by fixed effects; Conditional R^2 = proportion of variance explained by fixed and random effects.

Table S2.4.2. Fixed and random effect estimates for models predicting attitudes towards a vignette person from vignette and participant characteristics in Armenia.

Parameter	Model 1			Model 2			Model 3		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
				Fixed effects					
Intercept	4.54	0.09	< .001	3.70	0.15	< .001	3.44	0.19	< .001
Level 1 (Within-Persons)									
Vignette dimensions									
Age: Young	Ref.								
Age: Middle–aged	-0.18	0.04	< .001	-0.22	0.05	< .001	-0.22	0.05	< .001
Age: Elderly	-0.18	0.04	< .001	-0.23	0.05	< .001	-0.23	0.05	< .001
Gender: Female	Ref.								
Gender: Male	-0.13	0.04	< .001	-0.09	0.04	.013	-0.08	0.04	0.033
Ethnicity: Armenian	Ref.								
Ethnicity: Russian	-0.16	0.05	< .001	-0.03	0.07	.628	-0.04	0.07	0.592
Ethnicity: Yazidi	-0.10	0.05	.045	0.04	0.07	.589	0.03	0.07	0.637
Place: Capital city	Ref.								
Place: Regional town	0.04	0.04	.315	0.06	0.04	.201	0.06	0.04	0.174
Place: Village	-0.06	0.04	.193	-0.06	0.05	.213	-0.06	0.05	0.215
Religion: Christian	Ref.								
Religion: Yazidi	-0.19	0.06	.002	-0.05	0.07	.420	-0.06	0.07	0.398
Religion: Not religious	-0.30	0.04	< .001	-0.19	0.05	< .001	-0.20	0.05	< .001
Sexual orientation: Heterosexual	Ref.								
Sexual orientation: Homosexual	-1.37	0.04	< .001	-0.80	0.07	< .001	-0.75	0.07	< .001
Education: University	Ref.								
Education: Vocational	-0.19	0.04	< .001	-0.19	0.05	< .001	-0.20	0.05	< .001
Education: High school	-0.10	0.04	.026	-0.10	0.05	.048	-0.11	0.05	.039
Occupation: Professional	Ref.								
Occupation: Low–skilled	-0.30	0.04	< .001	-0.32	0.05	< .001	-0.33	0.05	< .001
Occupation: Unemployed	-0.75	0.05	< .001	-0.76	0.05	< .001	-0.77	0.05	< .001
Income: Wealthy	Ref.								
Income: Average	0.14	0.04	.001	0.16	0.04	< .001	0.16	0.04	< .001
Income: Poor	-0.14	0.04	.002	-0.13	0.04	.002	-0.13	0.04	.002
Shared group membership									
Age (ingroup)				-0.07	0.04	.144	-0.07	0.04	.141
Gender (ingroup)				0.08	0.04	.034	0.08	0.04	.025
Ethnicity (ingroup)				0.17	0.07	.011	0.17	0.07	.012
Place (ingroup)				-0.03	0.04	.487	-0.03	0.04	.465
Religion (ingroup)				0.18	0.05	<.001	0.17	0.05	<.001
Sexual orientation (ingroup)				0.65	0.07	<.001	0.72	0.07	<.001
Education (ingroup)				-0.02	0.05	.691	-0.03	0.05	.590
Occupation (ingroup)				-0.01	0.04	.740	-0.02	0.04	.610
Income (ingroup)				-0.10	0.04	.010	-0.10	0.04	.007
Level 2 (Between-Persons)									
Age: Young	Ref.								
Age: Middle–aged							-0.24	0.14	.082

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Parameter	Model 1			Model 2			Model 3		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
Age: Elderly							0.42	0.19	.029
Gender: Female	Ref.								
Gender: Male							0.22	0.11	.053
Ethnicity: Armenian	Ref.								
Ethnicity: Russian							0.07	0.21	.754
Ethnicity: Yazidi							0.12	0.91	.899
Place: Capital city	Ref.								
Place: Regional town							0.20	0.12	.084
Place: Village							0.05	0.15	.726
Religion: Christian	Ref.								
Religion: Yazidi							0.32	0.89	.720
Religion: Not religious							0.06	0.15	.685
Sexual orientation: Heterosexual	Ref.								
Sexual orientation: Homosexual							1.30	0.21	< .001
Education: University	Ref.								
Education: Vocational							-0.13	0.18	.467
Education: High school							0.03	0.17	.841
Occupation: Professional	Ref.								
Occupation: Low–skilled							-0.07	0.17	.693
Occupation: Unemployed							0.08	0.15	.594
Income: Above average	Ref.								
Income: Average							-0.09	0.13	.489
Income: Below average							-0.01	0.15	.926
Random parameters									
Intercept (Between-Persons)	.792	.89		.839	.92		.651	.81	
Residual (Within-Persons)	.949	.97		.910	.95		.904	.95	
AIC	9389.9			9185.6			9070.6		
BIC	9504.7			9354.4			9335.5		
logLikelihood	-4675.9			-4564.8			-4491.3		
Marginal R^2	.229			.242			.314		
Conditional R^2	.580			.606			.602		

Note. Empty model: AIC = 10678.4, BIC = 10696.6, logLikelihood = -5336.2. Intercept variance = .739 (.86), residual variance = 1.52 (1.23), ICC = .327.

Marginal R^2 = proportion of variance explained by fixed effects; Conditional R^2 = proportion of variance explained by fixed and random effects.

Table S2.4.3. Fixed and random effect estimates for models predicting attitudes towards a vignette person from vignette and participant characteristics in Brazil.

Parameter	Model 1			Model 2			Model 3		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
				Fixed effects					
Intercept	4.65	0.08	< .001	4.43	0.09	< .001	4.50	0.20	< .001
Level 1 (Within-Persons)									
Vignette dimensions									
Age: Young	Ref.								
Age: Middle–aged	-0.06	0.03	.100	-0.06	0.03	.057	-0.06	0.03	.054
Age: Elderly	-0.02	0.03	.457	-0.03	0.03	.316	-0.03	0.03	.315
Gender: Female	Ref.								
Gender: Male	-0.08	0.03	.003	-0.09	0.03	.001	-0.09	0.03	.001
Ethnicity: White	Ref.								
Ethnicity: Mixed race	0.02	0.03	.614	0.02	0.03	.635	0.02	0.03	.637
Ethnicity: Black	0.04	0.03	.280	0.05	0.04	.171	0.05	0.04	.174
Place: Capital city	Ref.								
Place: Regional town	-0.00001	0.03	1.00	-0.001	0.03	.986	-0.001	1.03	.977
Place: Village	0.02	0.03	.581	0.04	0.03	.203	0.04	0.03	.204
Religion: Catholic	Ref.								
Religion: Evangelical	-0.04	0.03	.226	-0.03	0.03	.358	-0.03	0.03	.359
Religion: Not religious	-0.02	0.03	.493	0.02	0.03	.488	0.02	0.03	.491
Political views: Apolitical	Ref.								
Political views: Right	-0.13	0.03	<.001	-0.07	0.03	.035	-0.07	0.03	.035
Political views: Left	-0.15	0.03	<.001	-0.05	0.03	.170	-0.05	0.03	.172
Education: University	Ref.								
Education: High school	-0.04	0.04	.329	-0.04	0.04	.334	-0.04	0.04	.329
Education: Primary school	-0.02	0.04	.587	-0.01	0.04	.765	-0.01	0.04	.764
Occupation: Professional	Ref.								
Occupation: Low–skilled	0.02	0.05	.691	-0.03	0.05	.598	-0.03	0.05	.608
Occupation: Unemployed	-0.03	0.04	.563	-0.09	0.05	.084	-0.09	0.05	.088
Income: Rich	Ref.								
Income: Average	0.07	0.04	.035	0.06	0.04	.080	0.06	0.04	.079
Income: Poor	0.15	0.04	< .001	0.15	0.04	< .001	0.15	0.04	< .001
Shared group membership									
Age (ingroup)				-0.01	0.03	.668	-0.01	0.03	.664
Gender (ingroup)				0.03	0.03	.222	0.03	0.03	.233
Ethnicity (ingroup)				0.02	0.03	.559	0.02	0.03	.570
Place (ingroup)				0.06	0.03	.039	0.06	0.03	.038
Religion (ingroup)				0.20	0.03	< .001	0.20	0.03	< .001
Political views (ingroup)				0.27	0.03	< .001	0.27	0.03	< .001
Education (ingroup)				0.03	0.03	.388	0.03	0.03	.376
Occupation (ingroup)				-0.09	0.04	.031	-0.09	0.04	.033
Income (ingroup)				0.02	0.03	.420	0.02	0.03	.427
Level 2 (Between-Persons)									
Age: Young	Ref.								

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Parameter	Model 1			Model 2			Model 3		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
Age: Middle–aged							-0.04	0.12	.775
Age: Elderly							0.31	0.21	.150
Gender: Female	Ref.								
Gender: Male							-0.09	0.12	.426
Ethnicity: White	Ref.								
Ethnicity: Mixed race							0.20	0.13	.120
Ethnicity: Black							0.29	0.22	.177
Place: Capital city	Ref.								
Place: Regional town							0.15	0.12	.204
Place: Village							0.05	0.26	.854
Religion: Catholic	Ref.								
Religion: Evangelical							0.13	0.13	.322
Religion: Not religious							-0.34	0.16	.029
Political views: Apolitical	Ref.								
Political views: Right							-0.20	0.15	.172
Political views: Left							-0.06	0.17	.720
Education: University	Ref.								
Education: High school							-0.09	0.14	.514
Education: Primary school							0.06	0.19	.760
Occupation: Professional	Ref.								
Occupation: Low–skilled							-0.19	0.15	.214
Occupation: Unemployed							-0.13	0.37	.722
Income: Above average	Ref.								
Income: Average							-0.02	0.15	.913
Income: Below average							-0.20	0.19	.292
Random parameters									
Intercept (Between-Persons)	.903	.950		.903	.95		.823	.91	
Residual (Within-Persons)	.496	.704		.467	.68		.467	.68	
AIC	6900.1			6760.5			6769.7		
BIC	7019.0			6932.9			7043.2		
logLikelihood	-3430.1			-3351.2			-3338.9		
Marginal R^2	.008			.028			.086		
Conditional R^2	.648			.669			.669		

Note. Empty model: AIC = 6931.2, BIC = 6949.0, logLikelihood = -3462.6. Intercept variance = .901 (.95), residual variance = .509 (.71), ICC = .639.

Marginal R^2 = proportion of variance explained by fixed effects; Conditional R^2 = proportion of variance explained by fixed and random effects.

Table S2.4.4. Fixed and random effect estimates for models predicting attitudes towards a vignette person from vignette and participant characteristics in India.

Parameter	Model 1			Model 2			Model 3		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
				Fixed effects					
Intercept	4.49	0.08	< .001	4.29	0.10	< .001	4.18	0.21	< .001
Level 1 (Within-Persons)									
Vignette dimensions									
Age: Young	Ref.								
Age: Middle–aged	0.02	0.03	.500	0.02	0.03	.444	0.02	0.03	.560
Age: Elderly	0.02	0.03	.542	0.03	0.03	.435	0.00	0.03	.889
Gender: Female	Ref.								
Gender: Male	-0.10	0.03	< .001	-0.11	0.03	< .001	-0.10	0.03	< .001
Ethnicity: Bihari	Ref.								
Ethnicity: Bengali	0.04	0.03	.156	0.04	0.03	.237	0.04	0.03	.243
Ethnicity: Tamil	0.06	0.03	.050	0.05	0.03	.159	0.06	0.03	.066
Place: Capital city	Ref.								
Place: Regional town	-0.02	0.03	.620	-0.02	0.03	.643	-0.04	0.03	.222
Place: Village	0.005	0.03	.876	0.004	0.03	.917	-0.02	0.03	.538
Religion: Hindu	Ref.								
Religion: Muslim	-0.11	0.03	< .001	0.04	0.05	.346	0.06	0.05	.157
Religion: Not religious	-0.06	0.03	.080	0.11	0.05	.024	0.10	0.05	.036
Caste: Forward castes	Ref.								
Caste: Scheduled castes	-0.06	0.03	.054	-0.04	0.03	.204	-0.04	0.03	.228
Caste: OBC	-0.03	0.03	.314	-0.02	0.03	.463	-0.03	0.03	.352
Education: University	Ref.								
Education: High school	-0.07	0.03	.041	-0.11	0.05	.022	-0.13	0.05	.009
Education: Primary school	-0.17	0.04	< .001	-0.21	0.05	< .001	-0.23	0.05	< .001
Occupation: Professional	Ref.								
Occupation: Low–skilled	-0.10	0.04	.009	-0.11	0.05	.021	-0.12	0.05	.009
Occupation: Unemployed	-0.21	0.04	< .001	-0.21	0.04	< .001	-0.22	0.05	< .001
Income: Rich	Ref.								
Income: Average	0.10	0.03	< .001	0.07	0.04	.067	0.08	0.04	.050
Income: Poor	0.10	0.03	.003	0.10	0.03	.002	0.07	0.03	.038
Shared group membership									
Age (ingroup)				0.02	0.03	.602	0.02	0.03	.460
Gender (ingroup)				0.03	0.03	.277	0.02	0.03	.474
Ethnicity (ingroup)				0.08	0.03	.003	0.07	0.03	.006
Place (ingroup)				-0.0002	0.03	.996	-0.02	0.03	.491
Religion (ingroup)				0.21	0.04	< .001	0.20	0.04	<.001
Caste (ingroup)				0.04	0.03	.147	0.04	0.03	.172
Education (ingroup)				-0.05	0.04	.221	-0.08	0.05	.112
Occupation (ingroup)				-0.001	0.04	.975	-0.001	0.04	.977
Income (ingroup)				0.05	0.04	.133	0.02	0.04	.563
Level 2 (Between-Persons)									
Age: Young	Ref.								

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Parameter	Model 1			Model 2			Model 3		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
Age: Middle–aged							0.29	0.11	.007
Age: Elderly							-0.40	0.21	.067
Gender: Female	Ref.								
Gender: Male							0.07	0.11	.503
Ethnicity: Bihari	Ref.								
Ethnicity: Bengali							0.27	0.15	.065
Ethnicity: Tamil							0.30	0.14	.034
Place: Capital city	Ref.								
Place: Regional town							0.02	0.12	.868
Place: Village							0.25	0.21	.219
Religion: Hindu	Ref.								
Religion: Muslim							0.57	0.19	.003
Religion: Not religious							0.07	0.22	.768
Caste: Forward castes	Ref.								
Caste: Scheduled castes							0.43	0.17	.015
Caste: OBC							0.10	0.12	.401
Education: University	Ref.								
Education: High school							-0.04	0.19	.818
Education: Primary school							-0.89	0.56	.112
Occupation: Professional	Ref.								
Occupation: Low–skilled							-0.36	0.18	.042
Occupation: Unemployed							-0.54	0.23	.021
Income: Upper class	Ref.								
Income: Middle class							-0.27	0.15	.074
Income: Lower class							-0.54	0.33	.106
Random parameters									
Intercept (Between-Persons)	.961	.98		.960	.98		.759	.87	
Residual (Within-Persons)	.530	.728		.523	.72		.494	.70	
AIC	8256.2			8236.9			7716.7		
BIC	8378.1			8413.8			7995.4		
logLikelihood	-4108.1			-4089.4			-3812.4		
Marginal R^2	.017			.021			.121		
Conditional R^2	.651			.655			.653		

Note. Empty model: AIC = 8375.7, BIC = 8394.0, logLikelihood = -4184.9. Intercept variance = .960 (.98), residual variance = .558 (.75), ICC = .633.

Marginal R^2 = proportion of variance explained by fixed effects; Conditional R^2 = proportion of variance explained by fixed and random effects.

Mean scores of identity centrality, salience of conflict, and symbolic threat

Identity centrality
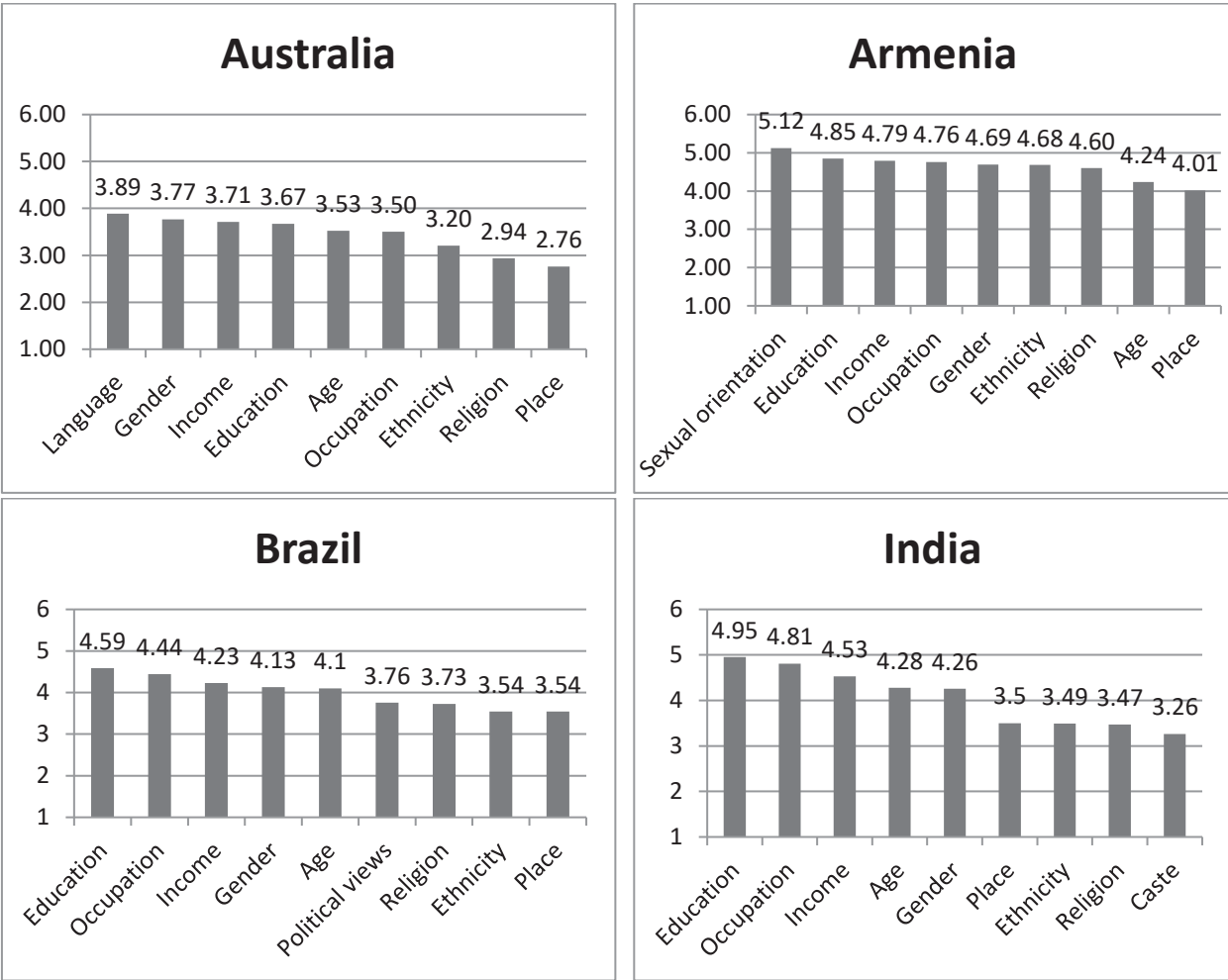
Figure S2.1. Mean scores of identity centrality across countries (on a 6-pt scale, higher scores – more importance)

Salience of intergroup conflict
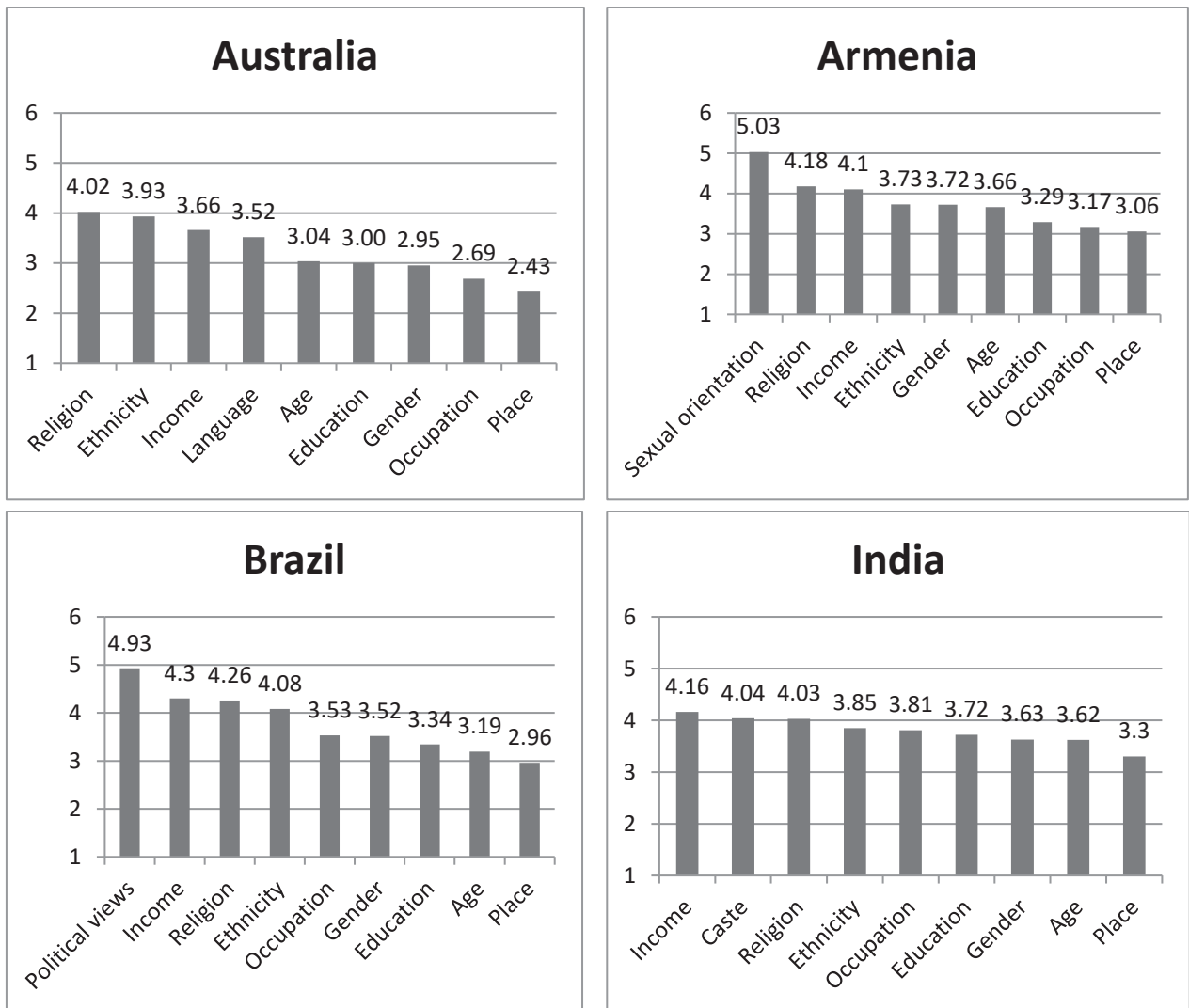
Figure S2.2. Mean scores of salience of intergroup conflict across countries (on a 6-pt scale, higher scores – more perceived conflict)

Perceived symbolic threat
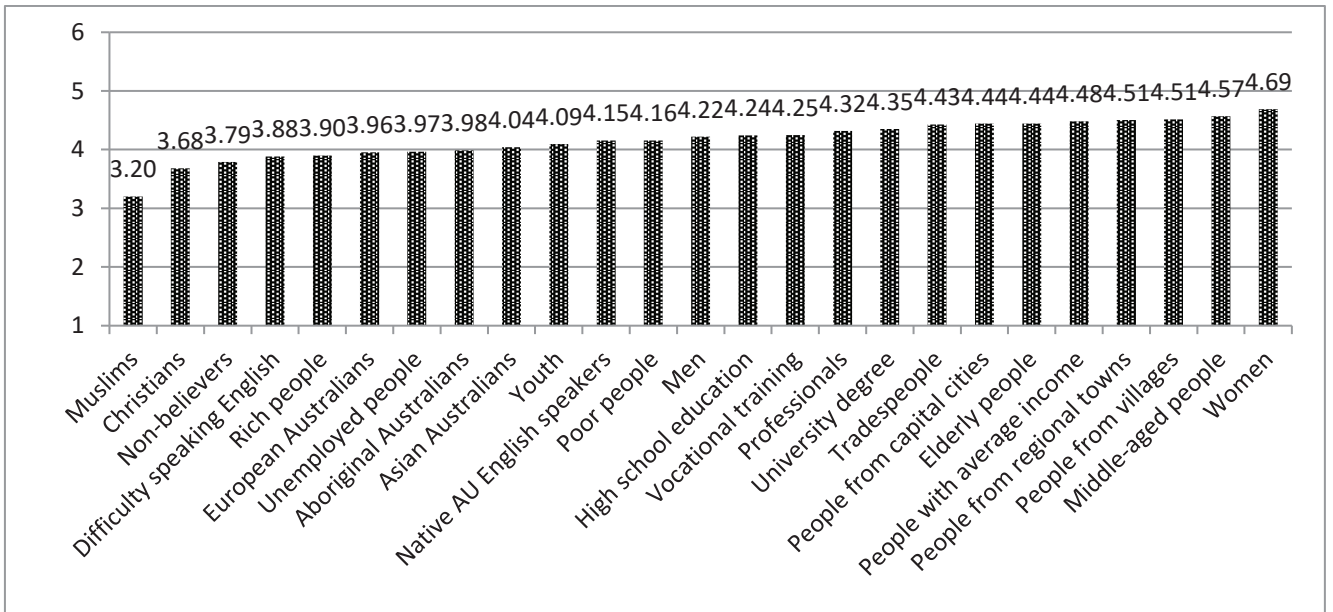
Figure S2.3.1. Mean scores of perceived symbolic threat from outgroups in Australia (on a 6-pt scale, higher scores – less threat)
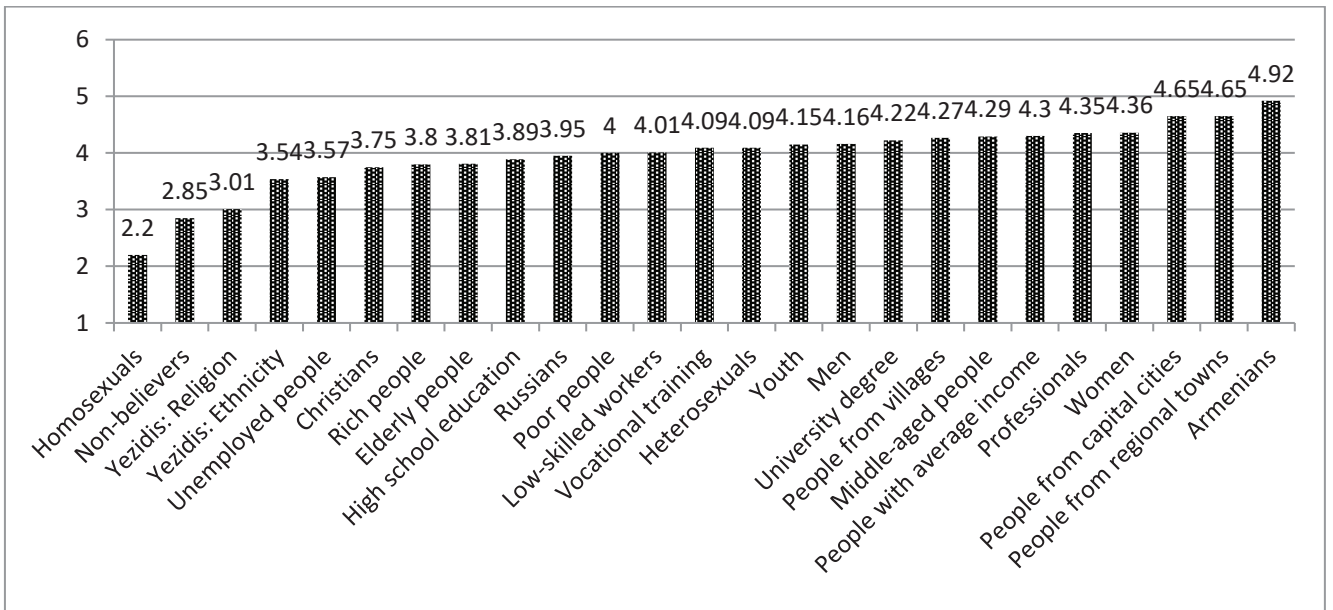
Figure S2.3.2. Mean scores of perceived symbolic threat from outgroups in Armenia
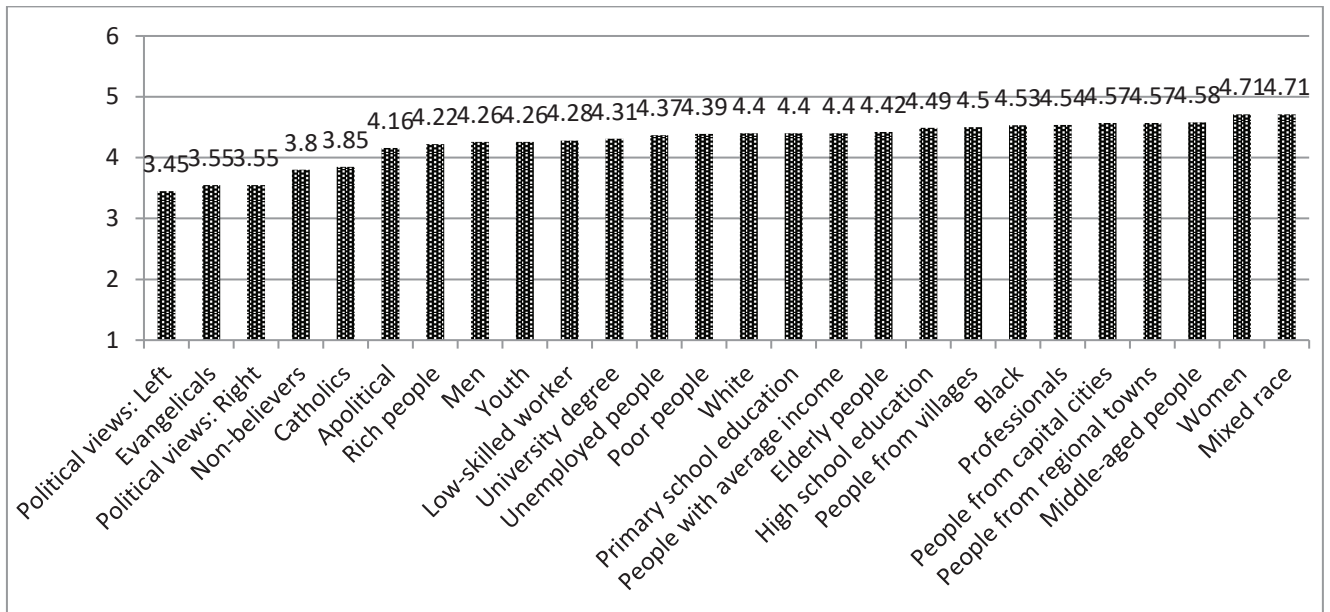
Figure S2.3.3. Mean scores of perceived symbolic threat from outgroups in Brazil
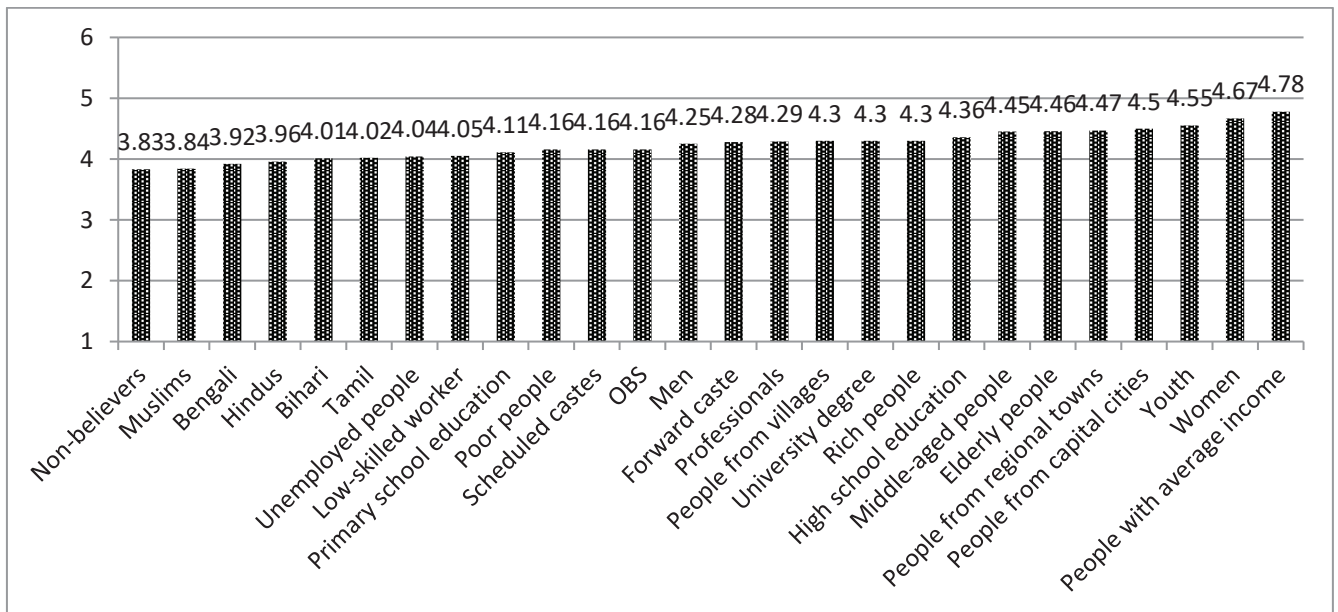
Figure S2.3.4. Mean scores of perceived symbolic threat from outgroups in India

Country selection
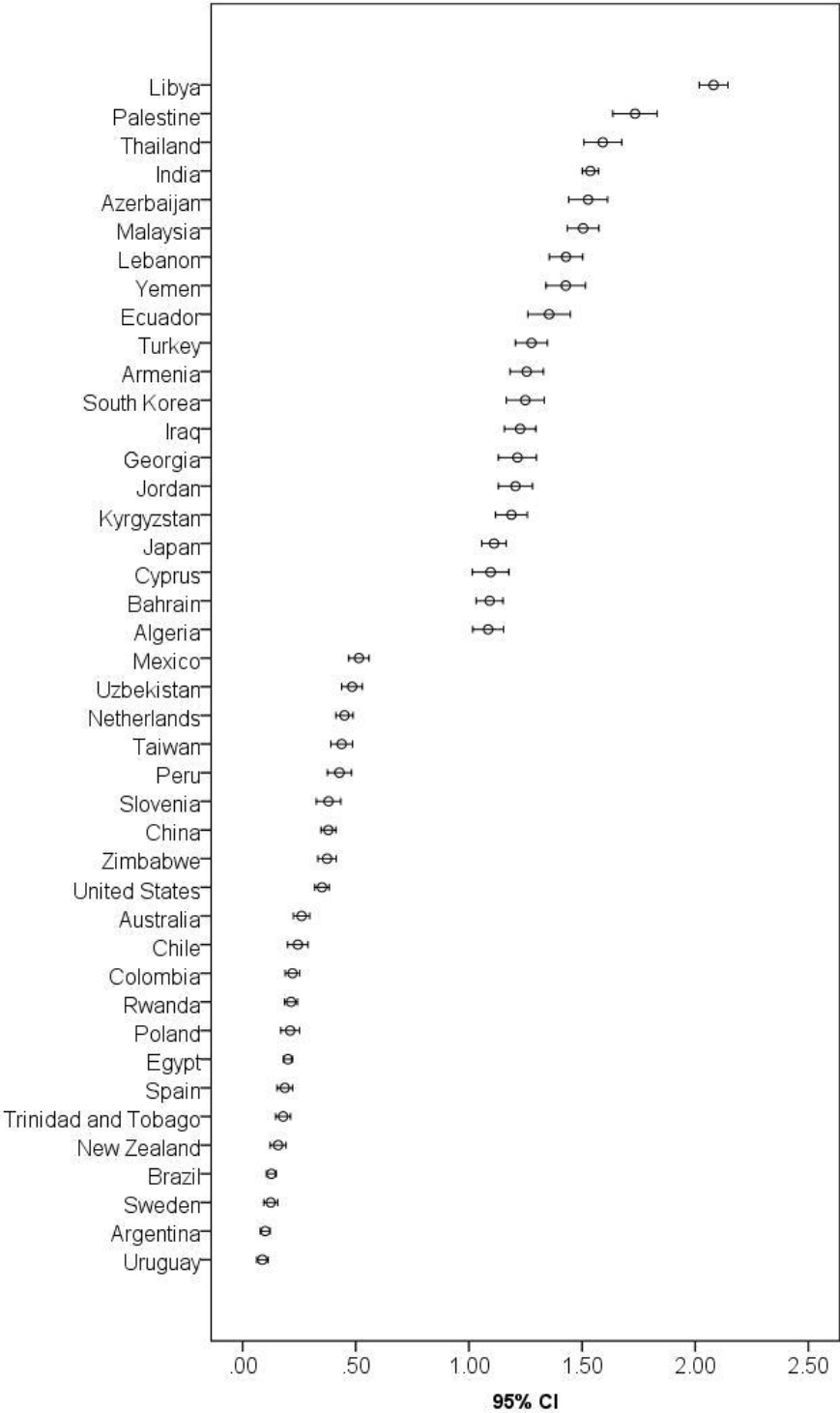
Figure S2.4.1. List of countries with highest and lowest acceptance of cultural diversity

Figure S2.4.2. List of countries with highest and lowest levels of inequality (income and education)

Mixed models testing country-level moderators

Table S2.5.1. Cross-level interactions between country-level acceptance of cultural diversity and shared group membership on the dimensions of ethnicity and religion in predicting attitudes.

| Parameter	Model 1			Model 2						Model 3					
				Model 2a			Model 2b			Model 3a			Model 3b		
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
						Fixed effects									
Intercept	4.07	0.06	<.001	4.06	0.06	<.001	4.09	0.06	<.001	4.08	0.06	<.001	4.08	0.06	<.001
Level 1 (Within-Persons)															
Vignette dimensions															
Age: Young															
Age: Middle-aged	-0.04	0.02	.035	-0.04	0.02	.039	-0.04	0.02	.036	-0.04	0.02	.039	-0.04	0.02	.035
Age: Elderly	-0.03	0.02	.144	-0.03	0.02	.143	-0.03	0.02	.135	-0.03	0.02	.132	-0.03	0.02	.130
Gender: Female															
Gender: Male	-0.08	0.01	<.001	-0.08	0.01	<.001	-0.08	0.01	<.001	-0.08	0.01	<.001	-0.08	0.01	<.001
Ethnicity: Majority															
Ethnicity: Minority1	0.01	0.02	.533	0.02	0.02	.401	0.01	0.02	.544	0.01	0.02	.515	0.01	0.02	.533
Ethnicity: Minority2	0.04	0.02	.063	0.04	0.02	.030	0.04	0.02	.049	0.04	0.02	.060	0.04	0.02	.056
Place: Capital city															
Place: Regional town	0.03	0.02	.085	0.03	0.02	.080	0.03	0.02	.091	0.03	0.02	.085	0.03	0.02	.092
Place: Village	0.01	0.02	.599	0.01	0.02	.596	0.01	0.02	.550	0.01	0.02	.627	0.01	0.02	.525
Religion: Majority															
Religion: Minority	-0.09	0.02	<.001	-0.09	0.02	<.001	-0.09	0.02	<.001	-0.09	0.02	<.001	-0.10	0.02	<.001
Religion: Not religious	-0.03	0.02	.109	-0.03	0.02	.112	-0.03	0.02	.119	-0.03	0.02	.103	-0.04	0.02	.045
Country-specific: Majority															
Country-specific: Minority1	-0.26	0.02	<.001	-0.26	0.02	<.001	-0.26	0.02	<.001	-0.27	0.02	<.001	-0.26	0.02	<.001
Country-specific: Minority2	-0.13	0.02	<.001	-0.13	0.02	<.001	-0.14	0.02	<.001	-0.13	0.02	<.001	-0.14	0.02	<.001
Education: High															
Education: Average	-0.04	0.02	.041	-0.04	0.02	.044	-0.04	0.02	.037	-0.04	0.02	.047	-0.04	0.02	.035
Education: Low	-0.05	0.02	.013	-0.05	0.02	.013	-0.05	0.02	.011	-0.05	0.02	.014	-0.05	0.02	.011
Occupation: High															
Occupation: Average	-0.11	0.02	<.001	-0.11	0.02	<.001	-0.11	0.02	<.001	-0.11	0.02	<.001	-0.11	0.02	<.001
Occupation: Low	-0.30	0.02	<.001	-0.30	0.02	<.001	-0.30	0.02	<.001	-0.30	0.02	<.001	-0.30	0.02	<.001
Income: High															
Income: Average	0.07	0.02	<.001	0.07	0.02	<.001	0.07	0.02	<.001	0.07	0.02	<.001	0.07	0.02	<.001
Income: Low	0.00	0.02	.798	-0.01	0.02	.773	-0.01	0.02	.745	-0.01	0.02	.736	-0.01	0.02	.741

Parameter	Model 1 Est.	Model 1 S.E.	Model 1 p	Model 2a Est.	Model 2a S.E.	Model 2a p	Model 2b Est.	Model 2b S.E.	Model 2b p	Model 3a Est.	Model 3a S.E.	Model 3a p	Model 3b Est.	Model 3b S.E.	Model 3b p
	Model 1			Model 2						Model 3					
				Model 2a			Model 2b			Model 3a			Model 3b		
Shared group membership															
Age (ingroup)	0.02	0.02	.147	0.02	0.02	.172	0.02	0.02	.157	0.02	0.02	.162	0.02	0.02	.157
Gender (ingroup)	0.04	0.01	.003	0.04	0.01	.003	0.04	0.01	.003	0.04	0.01	.003	0.04	0.01	.003
Ethnicity (ingroup)	0.07	0.02	< .001	0.07	0.02	< .001	0.07	0.02	< .001	0.03	0.02	< .001	0.07	0.02	< .001
Place (ingroup)	0.01	0.02	.536	0.01	0.02	.518	0.01	0.02	.478	0.01	0.02	.520	0.01	0.02	.492
Religion (ingroup)	0.18	0.02	< .001	0.19	0.02	< .001	0.18	0.02	< .001	0.18	0.02	< .001	0.21	0.02	< .001
Country-specific (ingroup)	0.28	0.02	< .001	0.28	0.02	< .001	0.28	0.02	< .001	0.28	0.02	< .001	0.28	0.02	< .001
Education (ingroup)	0.01	0.02	.619	0.01	0.02	.625	0.01	0.02	.634	0.01	0.02	.634	0.01	0.02	.638
Occupation (ingroup)	-0.01	0.02	.510	-0.01	0.02	.486	-0.01	0.02	.522	-0.01	0.02	.483	-0.01	0.02	.504
Income (ingroup)	-0.02	0.02	.208	-0.02	0.02	.210	-0.02	0.02	.249	-0.02	0.02	.216	-0.02	0.02	.255
Level 2 (Between-Persons)															
Country-level ACD (low)	-0.66	0.05	< .001	-0.65	0.05	< .001	-0.68	0.05	< .001	-0.68	0.06	< .001	-0.64	0.06	< .001
Country-level Inequality (high)	0.86	0.05	< .001	0.85	0.05	< .001	0.83	0.05	< .001	0.85	0.05	< .001	0.83	0.05	< .001
Cross-level interactions															
Ethnicity (ingroup) *ACD										0.07	0.03	.036			
Religion (ingroup) * ACD													-0.06	0.03	.077
Random parameters															
Residual (Within-Persons)	0.658	.81		0.657	.81		0.651	.81		0.657	.81		0.651	.81	
Ethnicity (ingroup) / Intercept				0.913	.96					0.912	.96				
Ethnicity (ingroup) / Slope				0.003	.06	.002				0.003	.06	.002			
Religion (ingroup) / Intercept							0.952	.98					0.952	.98	
Religion (ingroup) / Slope							0.025	.16	< .001				0.024	.16	< .001
AIC	34345.2			34336.3			34300.9			34333.9			34299.8		
BIC	34576.3			34582.3			34546.9			34587.4			34553.2		
logLikelihood	-17141.6			-17135.1			-17117.4			-17133.0			-17115.9		
Marginal R²	.157			.155			.154			.156			.152		
Conditional R²	.639			.639			.641			.639			.641		

Table S2.5.2. Cross-level interactions between country-level inequality and vignette person's education, occupation, and income in predicting attitudes.

| | Model 1 | | | | | | | | | Model 2 | | | | | |
| Parameter | Model 1a | | | Model 1b | | | Model 1c | | | Model 2a | | | Model 2b | | |
	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
								Fixed effects							
Intercept	4.07	0.06	<.001	4.06	0.06	<.001	4.07	0.06	<.001	4.11	0.06	<.001	4.12	0.06	<.001
Level 1 (Within-Persons)															
Vignette dimensions															
Age: Young															
Age: Middle–aged	-0.04	0.02	.037	-0.04	0.02	.033	-0.04	0.02	.029	-0.04	0.02	.024	-0.04	0.02	.012
Age: Elderly	-0.03	0.02	.144	-0.03	0.02	.093	-0.03	0.02	.111	-0.03	0.02	.060	-0.03	0.02	.107
Gender: Female															
Gender: Male	-0.08	0.01	<.001	-0.08	0.01	<.001	-0.08	0.01	<.001	-0.08	0.01	<.001	-0.08	0.01	<.001
Ethnicity: Majority															
Ethnicity: Minority1	0.01	0.02	.547	0.01	0.02	.443	0.01	0.02	.485	0.01	0.02	.503	0.02	0.02	.429
Ethnicity: Minority2	0.04	0.02	.068	0.04	0.02	.037	0.04	0.02	.064	0.04	0.02	.027	0.03	0.02	.071
Place: Capital city															
Place: Regional town	0.03	0.02	.083	0.03	0.02	.085	0.03	0.02	.074	0.03	0.02	.065	0.03	0.02	.077
Place: Village	0.01	0.02	.582	0.01	0.02	.611	0.01	0.02	.617	0.01	0.02	.636	0.01	0.02	.735
Religion: Majority															
Religion: Minority	-0.09	0.02	<.001	-0.09	0.02	<.001	-0.09	0.02	<.001	-0.09	0.02	<.001	-0.09	0.02	<.001
Religion: Not religious	-0.03	0.02	.105	-0.03	0.02	.089	-0.03	0.02	.103	-0.03	0.02	.116	-0.03	0.02	.144
Country-specific: Majority															
Country-specific: Minority1	-0.26	0.02	<.001	-0.26	0.02	<.001	-0.27	0.02	<.001	-0.26	0.02	<.001	-0.26	0.02	<.001
Country-specific: Minority2	-0.13	0.02	<.001	-0.13	0.02	<.001	-0.13	0.02	<.001	-0.14	0.02	<.001	-0.13	0.02	<.001
Education: High															
Education: Average	-0.04	0.02	.041	-0.04	0.02	.067	-0.04	0.02	.027	-0.04	0.02	.031	-0.05	0.02	.008
Education: Low	-0.05	0.02	.012	-0.05	0.02	.009	-0.05	0.02	.008	-0.08	0.02	<.001	-0.06	0.02	.004
Occupation: High															
Occupation: Average	-0.11	0.02	<.001	-0.11	0.02	<.001	-0.11	0.02	<.001	-0.14	0.03	<.001	-0.11	0.02	<.001
Occupation: Low	-0.30	0.02	<.001	-0.30	0.02	<.001	-0.30	0.02	<.001	-0.44	0.03	<.001	-0.29	0.02	<.001
Income: High															
Income: Average	0.07	0.02	<.001	0.07	0.02	<.001	0.07	0.02	<.001	0.08	0.02	<.001	0.05	0.03	.034
Income: Low	-0.004	0.02	.813	-0.01	0.02	.705	-0.004	0.02	.812	-.0004	0.02	.981	-0.13	0.03	<.001

| | Model 1 | | | | | | | | | Model 2 | | | | | |
| | Model 1a | | | Model 1b | | | Model 1c | | | Model 2a | | | Model 2b | | |
Parameter	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p	Est.	S.E.	p
Shared group membership															
Age (ingroup)	0.02	0.02	.146	0.02	0.02	.165	0.02	0.02	.176	0.02	0.02	.151	0.02	0.02	.212
Gender (ingroup)	0.04	0.01	.003	0.04	0.01	.003	0.04	0.01	.003	0.05	0.01	.002	0.04	0.01	.003
Ethnicity (ingroup)	0.07	0.02	< .001	0.06	0.02	< .001	0.07	0.02	< .001	0.06	0.02	< .001	0.07	0.02	< .001
Place(ingroup)	0.01	0.02	.543	0.01	0.02	.551	0.01	0.02	.548	0.01	0.02	.542	0.01	0.02	.513
Religion (ingroup)	0.18	0.02	< .001	0.18	0.02	< .001	0.18	0.02	< .001	0.18	0.02	< .001	0.18	0.02	< .001
Country-specific (ingroup)	0.28	0.02	< .001	0.29	0.02	< .001	0.29	0.02	< .001	0.29	0.02	< .001	0.29	0.02	< .001
Education (ingroup)	0.01	0.02	.660	0.01	0.02	.575	0.01	0.02	.687	0.01	0.02	.615	-0.01	0.02	.693
Occupation (ingroup)	-0.01	0.02	.540	-0.01	0.02	.732	-0.01	0.02	.579	0.001	0.02	.960	-0.01	0.02	.563
Income (ingroup)	-0.02	0.02	.204	-0.02	0.02	.205	-0.02	0.02	.174	-0.02	0.02	.233	-0.003	0.02	.845
Level 2 (Between-Persons)															
Country-level ACD (low)	-0.65	0.05	< .001	-0.63	0.05	< .001	-0.68	0.05	< .001	-0.63	0.06	< .001	-0.68	0.04	< .001
Country-level Inequality (high)	0.85	0.05	< .001	0.83	0.05	< .001	0.89	0.05	< .001	0.70	0.04	< .001	0.77	0.04	< .001
Cross-level interactions															
Occupation: Average * Inequality										0.09	0.04	.025			
Occupation: Low * Inequality										0.30	0.04	< .001			
Income: Average * Inequality													0.02	0.04	.632
Income: Low * Inequality													0.26	0.04	< .001
Random parameters															
Residual (Within-Persons)	0.657	.81		0.635	.80		0.648	.80		0.634	.80		0.646	.80	
Education / Intercept	0.848	.92													
Education / Slope	.0002/.001	.01/.04	.528												
Occupation / Intercept				0.873	.93					0.872	.93				
Occupation / Slope				.03/.12	.17/.35	< .001				.03/.10	.17/.32	< .001			
Income / Intercept							0.905	.95					0.902	.95	
Income / Slope							.02/.05	.15/.22	.012				.02/.04	.14/.20	.058
AIC	34351.1			34304.6			34340.5			34245.7			34281.4		
BIC	34619.4			34573.0			34608.9			34529.0			34564.7		
logLikelihood	-17139.5			-17116.3			-17134.3			-17084.9			-17102.7		
Marginal R²	.155			.148			.164			.155			.161		
Conditional R²	.638			.648			.647			.651			.647		

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Bremen, 26 March 2019 _____ Lusine Grigoryan