



Case Report

The ABC of society: Perceived similarity in agency/socioeconomic success and conservative-progressive beliefs increases intergroup cooperation ^{☆, ☆☆}

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ABSTRACT

The dimensions that explain which societal groups cooperate more with which other groups remain unclear. We predicted that perceived similarity in agency/socioeconomic success and conservative-progressive beliefs increases cooperation across groups. Self-identified members ($N = 583$) of 30 society-representative U.S. groups (gays, Muslims, Blacks, upper class, women, Democrats, conservatives etc.) played an incentivized one-time continuous prisoner's dilemma game with one self-identified member of each of these groups. Players knew nothing of each other except one group membership. Consistent with the ABC (agency-beliefs-communion) model of spontaneous stereotypes, perceived self-group similarity in agency and beliefs independently increased expected and actual cooperation across groups, controlling for shared group membership. Similarity in conservative-progressive beliefs had a stronger effect on cooperation than similarity in agency, and this effect of similarity in beliefs was stronger for individuals with extreme (progressive or conservative) compared to moderate beliefs.

1. Introduction

Social dilemmas are frequent, relevant, and characterized by that cooperation leads to better outcomes across people, but so long as others cooperate, each individual is better off by defecting (Dawes, 1980). To illustrate, many (in)voluntary teams (e.g., developing the Tesla Cybertruck, a vaccine against COVID-19 etc.) would succeed to a higher degree if everyone put in their best work, but each free rider gains a share of whatever degree of team success and, at the same time, has ample time to pursue other gains (e.g., assets, fun etc.). Game theory predicts that individuals defect to preclude higher losses than gains and gaining less than others. However, individuals cooperate to some degree in the lab and everyday life (Balliet & Van Lange, 2013), even in one-time, fully anonymous encounters (Dal Bó & Fréchet, 2018; Dorrough & Glöckner, 2016) that preclude immediate reward and punishment by others. Given the central role of this cooperative success in the evolution of human societies (Hardin, 1968, Henrich, 2004; Richerson et al., 2016), researching explanations of cooperation in social dilemmas remains a topic of great scientific interest.

Besides prosocial character (Mischkowski, Glöckner, & Lewisch, 2018), intuitive decision making (Rand, 2016), wise reasoning (Grossmann, Brienza, & Bobocel, 2017), the norm to cooperate (Fehr & Fischbacher, 2004), estimating that others cooperate (Dorrough & Glöckner, 2016), and potential reward and punishment from others (Balliet, Mulder, & Van Lange, 2011), another explanation of cooperation in social dilemmas is perceived similarity (Antal, Ohtsuki, Wakeley, Taylor, & Nowak, 2009; Colman, Browning, & Pulford, 2012; Fischer, 2009; Riolo, Cohen, & Axelrod, 2001). There are many reasons for this. Perceived similarity signals some degree of kinship (Park & Schaller, 2005), trustworthiness (Koch et al., 2020), likability (Alves, Koch, & Unkelbach, 2017, 2018), and opportunity to form a group (Herman, Flake, & Freeman, 2018). It increases likelihood of re-encounter (i.e., birds of a feather flock together; McPherson, Smith-Lovin, & Cook, 2001) and thereby reciprocity as well as reward and punishment by previously met individuals and their social network (Yamagishi, Jin, & Kiyonari, 1999). As perceived kinship, trustworthiness, and likability, sharing group membership, reciprocity, reward,

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and punishment all explain cooperation in social dilemmas (Rand & Nowak, 2013), it is almost necessary that perceived similarity does as well.

Who cooperates with whom in the U.S.?

To explain who perceives whom as similar to the self and thereby cooperates with them, research must answer two questions. First, individuals divide their environment/society into which types of people (Kawakami, Amodio, & Hugenberg, 2017)? And second, individuals perceive these social identities as similar on which dimensions (Pattyn, Rosseel, & Van Hiel, 2013)? For the U.S., we (Koch, Imhoff, Dotsch, Unkelbach, & Alves, 2016) answered these two questions with theoretically impartial, mostly data-driven research. A first sample of U.S. residents spontaneously listed up to 30 groups (“Off the top of your head, what various types of people do you think today’s society categorizes into groups?”). To other U.S.-citizens we presented in the center of a blank screen the most frequently listed groups (“Blacks”, “Whites”, “poor people”, “middle class”, “rich people”, “Hispanics”, “Asians”, “Democrats”, “Republicans” etc.). We tasked the latter individuals to drag and drop the groups back and forth on the screen, placing subjectively similar groups close together and subjectively dissimilar groups far apart (i.e., at opposite ends of the screen). We gave no other instructions, and thus individuals were free to place at opposite ends of the screen groups they perceived as dissimilar in morality, ability, or any other dimension (Abele, Ellemers, Fiske, Koch, & Yzerbyt, 2020).

Having completed this spatial arrangement task (Koch et al., 2016; Koch, Speckmann, & Unkelbach, 2020), most individuals directly or indirectly indicated that they had spontaneously perceived and arranged the groups’ (dis)similarity on two bundles of dimensions. First, agency/socioeconomic success (see also Zou & Cheryan, 2017) with groups perceived as “powerless”, “low status”, “dominated”, “poor”, “unconfident”, and “unassertive” on one end versus “powerful”, “high status”, “dominant”, “wealthy”, “confident”, and “competitive” on the other end. And second, conservative-progressive beliefs (see also Brandt, 2017) with groups perceived as “traditional”, “religious”, “conventional”, and “conservative” on one end versus “modern”, “science-oriented”, “alternative”, and “liberal” on the other end (Koch et al., 2016). In subsequent data-driven research, individuals spontaneously perceived and arranged the (dis)similarity of U.S. job holders and state dwellers on the same two bundles of dimensions (Imhoff, Koch, & Flade, 2018; Koch, Kervyn, Kervyn, & Imhoff, 2018). If “thinking is for doing” (Fiske, 1992, p. 877), paying attention to people’s (dis)similarity in agency and beliefs motivates which social behavior(s)?

Given that perceived similarity explains cooperation, U.S. residents should cooperate more with members of groups they perceive as more similar to the self in agency. Likewise, cooperation should increase with perceived self-group similarity in beliefs. There is further reason to believe so. U.S. residents who perceived others as more similar to the self in agency perceived them as higher in communion (a.k.a. trustworthiness and likability; Koch et al., 2016), and perceived communion of others also increased with perceived other-self similarity in beliefs (Koch et al., 2018; Koch, Imhoff, et al., 2020). Perceived communion co-explains the effect of perceived similarity on cooperation (Balliet & Van Lange, 2013). Thus, perceived similarity in agency (A) and beliefs (B) between the self and U.S. groups might increase cooperation with their members because of increasing their perceived communion (C).

In sum, we aimed to further explain the effect of perceived similarity on cooperation in social dilemmas (Fischer, 2009), by drawing on the agency-beliefs-communion (ABC) model of spontaneous stereotypes (Koch et al., 2016; Koch & Imhoff, 2018; Koch, Imhoff, et al., 2020). We predicted that U.S. residents cooperate more with members of groups they perceive as more similar to the self in agency/socioeconomic success and conservative-progressive beliefs. This would, for the first time, confirm that spontaneous (i.e., unmentioned) agency and beliefs stereotypes independently predict relevant behavior towards a variety of groups that together well-represent today’s U.S. society as per its residents.

Individuals who perceive their beliefs as more conservative might cooperate more with “elderly people” (vs. “gays”) not because they perceive “elderly people” (vs. “gays”) as more similar to the self in beliefs, but because they self-identify as a member of “elderly people” but not “gays”. Importantly, we were not interested in this well-studied effect of shared group membership (a.k.a. ingroup favoritism; Balliet, Wu, & De Dreu, 2014; Chen & Li, 2009; Romano, Balliet, Yamagishi, & Liu, 2017). To confirm that perceived self-group similarity in agency and beliefs independently increase cooperation beyond shared group membership, we measured and statistically controlled for shared group membership.

Contrary to our predictions, perceived self-group similarity in agency and beliefs might decrease cooperation because individuals want to positively distinguish the self-more strongly from more similar groups (Abrams & Hogg, 1990). Thus, we preregistered competing hypotheses (<http://aspredicted.org/blind.php?x=3pk4xs>). We report all conditions, measures, and exclusions, and all study materials, data, code, and results are available on the Open Science Foundation (OSF) website (<https://osf.io/2ebdg/>).

2. Methods

2.1. Participants and stimuli

In a pretest, 876 individuals recruited on Amazon’s MTurk self-identified (“yes, strongly” or “yes”) or did not self-identify (“no” or “prefer not to say”) with the 30 U.S. groups listed most frequently by other U.S. MTurkers whose task was to list 3–30 groups that together form society (Koch et al., 2016). This sample of psychologically U.S.-representative groups included Blacks, Whites, poor people, middle class, rich people, Hispanics, Asians, Democrats, Republicans, gays, Christians, liberals, conservatives, working class, transgender people, elderly people, students, lesbians, women, upper class, Muslims, athletes, parents, nerds, hippies, immigrants, atheists, blue collar, religious people, and men. Weeks later, 583 of these 876 individuals (284 women, 299 men; $M_{\text{age}} = 37.8$ years, $SD = 12.5$) took part in the main study. We did not exclude participants who completed the main study.

2.2. Procedure and measures

The (continuous) prisoner’s dilemma game precisely operationalizes a social dilemma for the case of two individuals. Two equally endowed players can cooperate or defect to varying degrees by simultaneously transferring none, some, or all of their resources to their coplayer. Each transfer doubles in value. If both players fully cooperate (i.e., transfer everything), added value will be maximal, mutual, and equally distributed. If the coplayer transfers less than the player, however, added value will be less than maximal and distributed against the player’s favor. And if the coplayer transfers less than half of what the player transfers, added value will no longer be mutual – the player will end up worse off than their initial endowment. Thus, players must fully defect (i.e. transfer nothing) to preclude losing resources and maximize distribution in their favor. Because mutual full defection precludes added value for both players, however, the compromise worth striving for is maximal, mutual, and equally distributed added value from mutual full cooperation.

In the role of self-identified member of one of the 30 groups (we struck a balance between assigning self-identifiers to rare groups [e.g., upper class and transgender people] and randomly assigning each person to one of their self-identified groups), individuals played an incentivized one-time continuous prisoner’s dilemma game with one self-identified member of each of the 30 groups (minimum, maximum, and average number of players per group = 7 [upper class], 27 [parents], and 19.43 [$SD = 4.73$], respectively). The order of these 30 games was random, their procedure the same. Players first learned their coplayer’s group, were reminded that they know nothing of each other

except one group membership, were endowed with 1 \$ each, indicated how much between \$0 and \$1 in steps of \$0.1 they expected (DV: *expectation*) from their coplayer (transfer was doubled), and then transferred between \$0 and \$1 in steps of \$0.1 to their coplayer (DV: *transfer*). Players did not learn of their coplayer's transfer at this point.

There was no mention of agency/socioeconomic success, conservative-progressive beliefs, and communion before and during the 30 games. That is, we did not prompt players to use these dimensions to adjust their expectations and transfers. Finally, players provided stereotype dimensions ratings and demographics. Specifically, they scored the 30 groups on agency, beliefs, and communion using 0–100 slider scales. Groups and stereotype dimensions were both presented in random order. As low versus high anchors of the agency scale we used “powerless/low status/dominated/poor/unconfident/unassertive” versus “powerful/high status/dominant/wealthy/confident/competitive”. The low anchor versus high anchors of the beliefs scale were labeled: “traditional/religious/conventional/conservative” versus “modern/science-oriented/alternative/liberal”. As low versus high scale anchors for communion we used “untrustworthy/dishonest/cold/threatening/repellent/egoistic” versus “trustworthy/sincere/warm/benevolent/likable/altruistic”. Additionally, players rated themselves twice on agency, beliefs, and communion (in random order) using the same 0–100 slider scales (we collected and averaged two ratings per dimension to increase measurement reliability), and then provided demographic information including sex, age, family status, highest educational degree, occupation, and income. As announced before the 30 games, a few days later we randomly selected one game and bonused players what they had not transferred in this game plus double of what their coplayer had transferred to them in the game (between \$0 and \$3). In addition, we paid each player a base payment of \$1 for taking part in the main study.

We computed our IV perceived self-group similarity in agency as $\text{similarity}(\text{agency})_{\text{private}} = 100 - |\text{player-scored agency of the whole self} - \text{player-scored agency of coplayer group}|$ (similarity_A_self in our preregistration). With private similarity, we mean hard to infer for the coplayer who only knew one group membership of the player. We computed our second IV perceived self-group similarity in beliefs as $\text{similarity}(\text{beliefs})_{\text{private}} = 100 - |\text{player-scored beliefs of the whole self} - \text{player-scored beliefs of coplayer group}|$ (similarity_B_self). We centered both variables at the midpoint of the similarity scale.

3. Confirmatory results

3.1. Shared group membership

First, we tested if a player cooperated more with a coplayer if this player also identified with the group that this coplayer represented in their game, compared to the player not identifying with the coplayer's group. That is, does shared versus non-shared group membership increase cooperation? In a linear mixed model (Judd, Westfall, & Kenny, 2012) with two random intercepts (player and coplayer group¹), we predicted players' expectation of money from their coplayer from shared group membership with “yes” and “no” coded as 1 vs. –1, respectively. Players expected more money if also belonging (\$0.55) versus not belonging (\$0.43) to their coplayer's group, $b = 5.67$, 95% CI = [5.25, 6.09], $p < .001$,² see Model 1.1 in Table OSM.1,

¹ Modeling random intercepts for both player and coplayer group allowed us to generalize the results we would obtain to both future participants and future stimuli (here: all societal groups). We constrained all random slope variances to 0 throughout this paper because estimating them our models would fail to converge (Barr, Levy, Scheepers, & Tily, 2013).

² To correct for increased type 1 error due to multiple null hypothesis significance testing, throughout this paper we interpreted $p > .01$ as non-significant.

$R^2 = 2.3\%$, 95% CI = [1.9%, 2.7%]. A second linear mixed model with the same random intercepts showed that players transferred more money to their coplayer if belonging (\$0.53) versus not belonging (\$0.43) to their coplayer's group, $b = 5.14$, 95% CI = [4.78, 5.51], $p < .001$, see Model 1.2 in Table OSM.1, $R^2 = 1.6\%$, 95% CI = [1.3%, 2.0%].

3.2. Perceived self-group similarity in agency and beliefs

Second, we statistically controlled for shared group membership and tested if a player cooperated more with a coplayer if this player perceived this coplayer as more similar to the self in agency and beliefs. In a linear mixed model with two random intercepts (player and coplayer group), we predicted players' expectation of money from their coplayer from shared group membership, $\text{similarity}(\text{agency})_{\text{private}}$ and $\text{similarity}(\text{beliefs})_{\text{private}}$, see Model 2.1 in Table OSM.1, $R^2 = 5\%$, 95% CI = [4.4%, 5.6%]. Beyond players expecting more money if also belonging (\$0.47) versus not belonging (\$0.39) to their coplayer's group, $b = 3.83$, 95% CI = [3.40, 5.51], $p < .001$, players expected more money from coplayers they perceived as maximally similar (\$0.47) versus maximally dissimilar (\$0.38) in agency, $b = 0.09$, 95% CI = [0.07, 0.11], $p < .001$, and from coplayers they perceived as maximally similar (\$0.53) versus maximally dissimilar (\$0.33) in beliefs, $b = 0.20$, 95% CI = [0.19, 0.21], $p < .001$. In a second linear mixed model with the same random intercepts, we predicted players' transfer of money to their coplayer from shared group membership, $\text{similarity}(\text{agency})_{\text{private}}$ and $\text{similarity}(\text{beliefs})_{\text{private}}$, see Model 2.2 in Table OSM.1, $R^2 = 3.4\%$, 95% CI = [2.9%, 4.0%]. Beyond players transferring more money to their coplayer if also belonging (\$0.47) versus not belonging (\$0.40) to their coplayer's group, $b = 3.54$, 95% CI = [3.17, 3.19], $p < .001$, players transferred more money to coplayers they perceived as maximally similar (\$0.46) versus maximally dissimilar (\$0.41) in agency, $b = 0.05$, 95% CI = [0.03, 0.07], $p < .001$, and to coplayers they perceived as maximally similar (\$0.53) versus maximally dissimilar (\$0.34) in beliefs, $b = 0.18$, 95% CI = [0.17, 0.20], $p < .001$. In sum, the intergroup cooperation effect of perceived similarity in beliefs was two times (expectation of money) to three times (transfer of money) larger than the intergroup cooperation effect of perceived similarity in agency, see Fig. 1.

Third, we statistically controlled for shared group membership and tested if a player cooperated more with a coplayer if this player perceived this coplayer as more similar to the self in agency and beliefs (i.e., privately perceived similarity), and – importantly – if the player also perceived the coplayer to perceive the self as more similar to the player in agency and beliefs (i.e. meta-perceived similarity) (Privately perceived similarity plus meta-perceived similarity makes publicly perceived similarity.) We recomputed perceived self-group similarity in agency as $\text{similarity}(\text{agency})_{\text{public}} = 100 - |\text{player-scored agency of player group shown to coplayer} - \text{player-scored agency of coplayer group}|$ (similarity_A_shown in our preregistration). With public similarity, we mean easy to infer for the coplayer who knew this group membership of the player. We recomputed perceived self-group similarity in beliefs as $\text{similarity}(\text{beliefs})_{\text{public}} = 100 - |\text{player-scored beliefs of player group shown to coplayer} - \text{player-scored beliefs of coplayer group}|$ (similarity_B_shown). We centered both variables as before.

We predicted players' expectation of money from their coplayer as before, except for replacing $\text{similarity}(\text{agency})_{\text{private}}$ and $\text{similarity}(\text{beliefs})_{\text{private}}$ with $\text{similarity}(\text{agency})_{\text{public}}$ and $\text{similarity}(\text{beliefs})_{\text{public}}$, respectively, see Model 2.3 in Table OSM.1, $R^2 = 3.4\%$, 95% CI = [2.9%, 3.9%]. And we predicted players' transfer of money to their coplayer as before, except for the same replacements, see Model 2.4 in Table OSM.1, $R^2 = 2.3\%$, 95% CI = [1.9%, 2.8%]. Although we made clear in each game that player and coplayer know nothing about each other except the two groups they represent, publicly perceived similarity in agency and beliefs explained less expectation variance (only 3.4% vs.

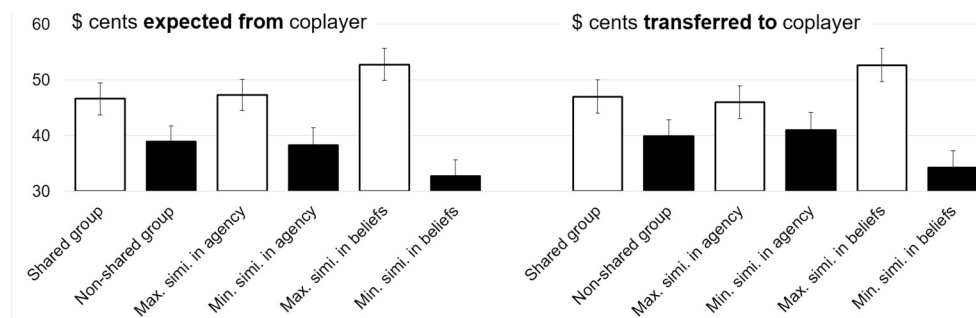


Fig. 1. Perceived self-group similarity in agency and beliefs independently increased expected and actual cooperation across 30 U.S.-representative groups, controlling for shared group membership. Error bars represent 95% confidence intervals.

5% in Model 2.1) and less transfer variance (only 2.3% vs. 3.4% in Model 2.2) than privately perceived similarity in agency and beliefs.³ It seems that players did not consider or prioritize strategizing in accordance with their perception of their coplayers' perception of their similarity in agency and beliefs.

4. Exploratory results

4.1. Mediating roles of perceived communion of, and expectation from, group

Fourth, we statistically controlled for shared group membership and tested two mediators of the independent cooperation (i.e., money transfer) effects of perceived self-group similarity in agency and beliefs. Recall that in Model 2.2, players transferred more money to coplayers they perceived as more similar to the self in agency, $b = 0.05$, 95% CI = [0.03, 0.07], $p < .001$, and to coplayers they perceived as more similar to the self in beliefs, $b = 0.18$, 95% CI = [0.17, 0.20], $p < .001$, controlling for shared group membership. In Model 3.1 in Table OSM.2, $R^2 = 7.9\%$, 95% CI = [7.2%, 8.7%], we added the mediator player-scored communion of coplayer group. Compared to Model 2.2, this reduced the explanatory power of both similarity (agency)_{private}, $b = 0.00$, 95% CI = [-0.02, 0.02], $p = .823$, and similarity (beliefs)_{private}, $b = 0.08$, 95% CI = [0.06, 0.09], $p < .001$. And in Model 3.2 in Table OSM.2, $R^2 = 36.9\%$, 95% CI = [35.9%, 38.0%], instead of player-scored communion of coplayer group we added the mediator player-scored expectation of money from coplayer group. Compared to Model 2.2, this also reduced the explanatory power of both similarity (agency)_{private}, $b = 0.00$, 95% CI = [-0.01, 0.01], $p = .938$, and similarity (beliefs)_{private}, $b = 0.07$, 95% CI = [0.06, 0.08], $p < .001$. Taken together, perceived communion of a group, expectation that its members will cooperate, or correlates of these might mediate the independent effects of perceived self-group similarity in agency and beliefs on behavioral cooperation with this group (here: transferring money). As we manipulated neither IVs nor mediators, however, such statistical mediation is necessary but not sufficient to show actual mediation (Fiedler, Harris, & Schott, 2018).

4.2. Nuances of perceived self-group similarity in agency and beliefs

Finally, we statistically controlled for shared group membership and tested if the cooperation (i.e., money transfer) effect of perceived self-group similarity in agency was larger in size for players who perceived the self as low, moderate, or high in agency. Likewise, we tested if the cooperation effect of perceived self-group similarity in beliefs was larger in size for players who perceived the self as conservative,

³ A second measure of private self-group similarity in agency and beliefs (similarity_A_hidden and similarity_B_hidden in our preregistration) confirmed this result (see Models 2.5 and 2.6 in Table OSM.1).

moderate, or progressive in beliefs. In a linear mixed model with two random intercepts (player and coplayer group), we predicted players' transfer to their coplayer from shared group membership, player-perceived agency_{player}, player-perceived agency_{coplayer group}, the interaction of the last two terms, squared player-perceived agency_{player}, squared player-perceived agency_{coplayer group}, player-perceived beliefs_{player}, player-perceived beliefs_{coplayer group}, the interaction of the last two terms, squared player-perceived beliefs_{player}, and squared player-perceived beliefs_{coplayer group}. We used linear combinations of these five predictors related to agency, and linear combinations of these five predictors related to beliefs, to compute parameters for two response surface analyses⁴ (RSA; for how to visualize and interpret combinations of RSA parameters, see Model 4.1 in Table OSM.3 and Humberg, Nestler, & Back, 2019).

The first RSA (for details, see Model 4.1 in Table OSM.3) showed that the cooperation effect of perceived self-group similarity in agency was larger in size for players who perceived the self as moderate in agency compared to players who perceived the self as extreme (i.e., low or high) in agency. By estimation, players who perceived the self as low in agency transferred \$0.32, \$0.33, and \$0.28 to coplayers they perceived as similarly low, moderate, and high in agency, respectively. Players who perceived the self as moderate in agency transferred \$0.46, \$0.49, and \$0.47 to coplayers they perceived as low, similarly moderate, and high in agency, respectively. And players who perceived the self as high in agency transferred \$0.28, \$0.34, and \$0.34 to coplayers they perceived as low, moderate, and similarly high in agency, respectively (see left side of Fig. 2). Perhaps the effect of similarity in agency was larger for players who perceived the self as moderate in agency because those others who perceived the self as extreme in agency transferred less money across coplayers – that is, possibly because of “the unfortunate have no means to contribute” combined with “the fortunate mean to not contribute” (Imhoff & Koch, 2017). Puzzlingly, it seems that increasing socioeconomic inequality (more people extreme compared to moderate in agency) strongly decreases baseline cooperation across groups, whereas increasing socioeconomic equality (more people moderate compared to extreme in agency) slightly decreases impartial cooperation across groups in society.

The second RSA (for details, see Model 4.2 in Table OSM.3) showed that the cooperation effect of perceived self-group similarity in beliefs was larger in size for players who perceived the self as extreme (i.e.,

⁴ Our RSAs required three assumptions to be met. First, high variance in player-perceived agency of the self ($M = 45.88$, $SD = 20.42$), agency of coplayer group ($M = 51.89$, $SD = 22.06$), beliefs of the self ($M = 61.47$, $SD = 33.59$), and beliefs of coplayer group ($M = 50.98$, $SD = 26.36$). Second, approximately equally many cases in which player-perceived agency of the self (vs. coplayer group) was higher (42%) and lower (55%), and in which player-perceived beliefs of the self (vs. coplayer group) was higher (61%) and lower (36%). And third, absence of multicollinearity (maximum variance inflation factor [VIF]_{our RSAs} = 1.34). Based on these statistics, we inferred that our data met these assumptions required by RSA (Humberg et al., 2019).

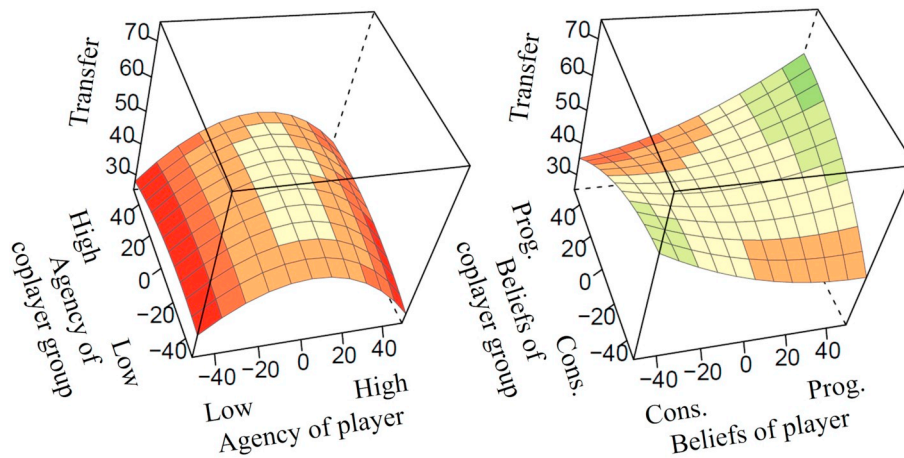


Fig. 2. Response surface analysis (RSA) showing that perceived self-group similarity in agency increased actual cooperation (\$ cents transferred) more strongly for players moderate versus extreme (low or high) in agency, and that perceived self-group similarity in beliefs increased actual cooperation more strongly for players extreme (conservative or progressive) versus moderate in beliefs. More green (red) hues indicate higher (lower) actual cooperation. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

conservative or progressive) in beliefs compared to players who perceived the self as moderate in beliefs. By estimation, players who perceived the self as conservative in beliefs transferred \$0.59, \$0.51, and \$0.35 to coplayers they perceived as similarly conservative, moderate, and progressive in beliefs, respectively. Players who perceived the self as moderate in beliefs transferred \$0.45, \$0.49, and \$0.44 to coplayer groups they perceived as conservative, similarly moderate, and progressive in beliefs, respectively. And players who perceived the self as progressive in beliefs transferred \$0.41, \$0.56, and \$0.63 to coplayers they perceived as conservative, moderate, and similarly progressive in beliefs, respectively (see right side of Fig. 2). Increasing political polarization thus poses an increasing challenge to impartial cooperation across groups within society. Future research should examine why perceived self-group similarity in beliefs better predicts behavioral cooperation for people who perceive the self as more extreme in beliefs (i.e., more conservative or progressive). Perhaps because extreme beliefs are less prevalent (sharing rate attitudes attracts; Alves, 2018), or because individuals with more extreme beliefs know or care more about their beliefs, or because entitativity is higher among those with more extreme beliefs (Lammers, Koch, Conway, & Brandt, 2017), or because holders of more extreme beliefs have less contact with holders of other beliefs etc.

5. Discussion

Societal sophistication, prosperity, and well-being require a great deal of interpersonal cooperation (Richerson et al., 2016). Cooperation reaches high levels when people have successfully collaborated before or expect to work together again in the foreseeable future. However, extensive cooperation fails in one-time encounters with unfamiliar others (Dal Bó & Fréchet, 2018). Given that 21st century business involves an increasing number of strangers that come and go (e.g., contractors and customers), research is needed that pinpoints people's barriers to cooperate with strangers in one-time encounters. For sure, there is merit in explaining why cooperation fails in one-time collaborations between just Whites and Blacks, between just adolescents and adults, between just women and men, between just natives and immigrants etc. We see even more value in developing a parsimonious model that explains why cooperation fails in one-time encounters between members all sorts of societal categories and groups.

To explain who cooperates with whom in the U.S., we recruited self-identified members of 30 groups representative of U.S. residents' perception of their society in 2015 (gays, Muslims, Blacks, upper class, women, Democrats, immigrants, atheists etc.). There was no mention of the dimensions agency/socioeconomic success (A) and conservative-progressive beliefs (B) before or during the incentivized one-time social dilemma game that they played with one self-identified member of each

of these groups. Players knew nothing of each other except one group membership, and we statistically controlled for shared group membership. Consistent with the agency-beliefs-communion (ABC) model of spontaneous stereotypes (Koch et al., 2016; Koch, Imhoff, et al., 2020) and as predicted, cooperation with a group (i.e., transferring money to, and thereby doubling it for, one of its members) increased with perceived self-group similarity in agency and beliefs, and perceived communion (C) of the group, and money expected in return, possibly mediated these two cooperation effects. The results confirmed for the first time that spontaneous (i.e., unmentioned) agency and beliefs stereotypes independently predict behavior towards a variety of groups that together well-represent today's U.S. society as per its residents.

The competing hypothesis derived from social identity and social comparison theory (Abrams & Hogg, 1990) that perceived self-group similarity in agency and beliefs decreases cooperation was not supported by our data. The former theory posits that people strive to be members of positively distinct groups, while the latter theory posits that people tend to compare their group with similar groups. Combining these two theories inspires the hypothesis that group members rival more with, and thereby cooperate less with, similar compared to dissimilar groups. However, consistent with homophily and the ABC model of spontaneous stereotypes, we found that cooperation increased with perceived self-group similarity in agency and beliefs. Future research could test whether cooperation with members of more similar groups decreases with increasing absence of members of more dissimilar groups.

6. Limitations

Ecological validity is a plus of our research given that we examined cooperation behavior among members of 30 groups representative of U.S. society as per its residents. However, it could be that perceived self-group similarity in agency and beliefs predict cooperation less well when multiple group memberships and/or other socially relevant information are presented (e.g., face and name), too. In this sense, establishing ecological validity is not complete yet. Towards establishing external validity, future research could aim to generalize our cooperation effects to other relevant behaviors such as fair distribution and generous donation (Jenkins, Karashchuk, Zhu, & Hsu, 2018). Future research should further examine internal validity (i.e., causation) by manipulating rather than, as here, measuring perceived other-self similarity in agency and beliefs. Further, agency and beliefs as defined in the ABC model of stereotypes (Koch et al., 2016; Koch, Imhoff, et al., 2020) are purposefully broad stereotype dimensions. Still, future research could investigate whether perceived self-group similarity in some compared to other facets of agency (power, status, dominance, wealth, confidence, and competitiveness) and beliefs (tradition,

religion, convention, and conservatism vs. modernism, orientation to science, alternativism, and liberalism) better predict cooperation and other socially relevant behaviors. Finally, it could be that self-group similarity on dimensions other than agency and beliefs also and better predict cooperation across groups (Abele et al., 2020; Fiske, 2018).

Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jesp.2020.103996>.

References

- Abele, A., Ellemers, N., Fiske, S., Koch, A., & Yzerbyt, V. (2020). *Navigating the social world: Shared horizontal and vertical evaluative dimensions*. (Submitted for publication).
- Abrams, D. E., & Hogg, M. A. (1990). *Social identity theory: Constructive and critical advances*. Berlin, Germany: Springer.
- Alves, H. (2018). Sharing rare attitudes attracts. *Personality and Social Psychology Bulletin*, *44*, 1270–1283.
- Alves, H., Koch, A., & Unkelbach, C. (2017). The “common good” phenomenon: Why similarities are positive and differences are negative. *Journal of Experimental Psychology: General*, *146*, 512–528.
- Alves, H., Koch, A., & Unkelbach, C. (2018). A cognitive-ecological explanation of intergroup biases. *Psychological Science*, *29*, 1126–1133.
- Antal, T., Ohtsuki, H., Wakeley, J., Taylor, P. D., & Nowak, M. A. (2009). Evolution of cooperation by phenotypic similarity. *Proceedings of the National Academy of Sciences*, *106*, 8597–8600.
- Balliet, D., Mulder, L. B., & Van Lange, P. A. (2011). Reward, punishment, and cooperation: A meta-analysis. *Psychological Bulletin*, *137*, 594–615.
- Balliet, D., & Van Lange, P. A. (2013). Trust, punishment, and cooperation across 18 societies: A meta-analysis. *Perspectives on Psychological Science*, *8*, 363–379.
- Balliet, D., Wu, J., & De Dreu, C. K. (2014). Ingroup favoritism in cooperation: A meta-analysis. *Psychological Bulletin*, *140*, 1556.
- Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language*, *68*, 255–278.
- Brandt, M. J. (2017). Predicting ideological prejudice. *Psychological Science*, *28*, 713–722.
- Chen, Y., & Li, S. X. (2009). Group identity and social preferences. *American Economic Review*, *99*, 431–457.
- Colman, A. M., Browning, L., & Pulford, B. D. (2012). Spontaneous similarity discrimination in the evolution of cooperation. *Journal of Theoretical Biology*, *299*, 162–171.
- Dal Bó, P., & Fréchette, G. R. (2018). On the determinants of cooperation in infinitely repeated games: A survey. *Journal of Economic Literature*, *56*, 60–114.
- Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology*, *31*, 169–193.
- Dorrough, A. R., & Glöckner, A. (2016). Multinational investigation of cross-societal cooperation. *Proceedings of the National Academy of Sciences*, *113*, 10836–10841.
- Fehr, E., & Fischbacher, U. (2004). Social norms and human cooperation. *Trends in Cognitive Sciences*, *8*, 185–190.
- Fiedler, K., Harris, C., & Schott, M. (2018). Unwarranted inferences from statistical mediation tests—An analysis of articles published in 2015. *Journal of Experimental Social Psychology*, *75*, 95–102.
- Fischer, I. (2009). Friend or foe: Subjective expected relative similarity as a determinant of cooperation. *Journal of Experimental Psychology: General*, *138*, 341–350.
- Fiske, S. T. (1992). Thinking is for doing: Portraits of social cognition from daguerreotype to laserphoto. *Journal of Personality and Social Psychology*, *63*, 877–889.
- Fiske, S. T. (2018). Stereotype content: Warmth and competence endure. *Current Directions in Psychological Science*, *27*, 67–73.
- Grossmann, I., Brienza, J. P., & Bobocel, D. R. (2017). Wise deliberation sustains cooperation. *Nature Human Behaviour*, *1*, 1–6.
- Hardin, G. (1968). The tragedy of the commons. *Science*, *162*, 1243–1248.
- Helman, E., Flake, J. K., & Freeman, J. B. (2018). The faces of group members share physical resemblance. *Personality and Social Psychology Bulletin*, *44*, 3–15.
- Henrich, J. (2004). Cultural group selection, coevolutionary processes and large-scale cooperation. *Journal of Economic Behavior and Organization*, *53*, 3–35.
- Humberg, S., Nestler, S., & Back, M. D. (2019). Response surface analysis in personality and social psychology: Checklist and clarifications for the case of congruence hypotheses. *Social Psychological and Personality Science*, *10*, 409–419.
- Imhoff, R., & Koch, A. (2017). How orthogonal are the Big Two of social perception? On the curvilinear relation between agency and communion. *Perspectives in Psychological Science*, *12*, 122–137.
- Imhoff, R., Koch, A., & Flade, F. (2018). (Pre)occupations: A data-driven model of jobs and its consequences for categorization and evaluation. *Journal of Experimental Social Psychology*, *77*, 76–88.
- Jenkins, A. C., Karashchuk, P., Zhu, L., & Hsu, M. (2018). Predicting human behavior toward members of different social groups. *Proceedings of the National Academy of Sciences*, *115*, 9596–9701.
- Judd, C. M., Westfall, J., & Kenny, D. A. (2012). Treating stimuli as a random factor in social psychology: A new and comprehensive solution to a pervasive but largely ignored problem. *Journal of Personality and Social Psychology*, *103*, 54–69.
- Kawakami, K., Amodio, D. M., & Hugenberg, K. (2017). Intergroup perception and cognition: An integrative framework for understanding the causes and consequences of social categorization. In J. M. Olson (Vol. Ed.), *Advances in experimental social psychology*. Vol. 55. *Advances in experimental social psychology* (pp. 1–80). San Diego, CA, US: Elsevier Academic Press.
- Koch, A., & Imhoff, R. (2018). Rethinking the nature and relation of fundamental dimensions of meaning. In A. Abele, & B. Wojciszke (Eds.), *Agency and communion in social psychology* (pp. 167–179). Abingdon, UK: Routledge.
- Koch, A., Imhoff, R., Dotsch, R., Unkelbach, C., & Alves, H. (2016). The ABC of stereotypes about groups: Agency/socioeconomic success, conservative–progressive beliefs, and communion. *Journal of Personality and Social Psychology*, *110*, 675–709.
- Koch, A., Imhoff, R., Unkelbach, C., Nicolas, G., Fiske, S., Terache, J., ... Yzerbyt, V. (2020). Groups' warmth is a personal matter: Understanding consensus on stereotype dimensions reconciles adversarial models of social evaluation. *Journal of Experimental Social Psychology*.
- Koch, A., Kervyn, N., Kervyn, A., & Imhoff, R. (2018). Studying the cognitive map of the U.S. states: Ideology and prosperity stereotypes predict interstate prejudice. *Social Psychological and Personality Science*, *9*, 530–538.
- Koch, A., Speckmann, F., & Unkelbach, C. (2020). Q-SpAM: Using spatial arrangement to measure similarity in efficient online research powered by Qualtrics. *Sociological Methods & Research*.
- Lammers, J., Koch, A., Conway, P., & Brandt, M. J. (2017). The political domain appears simpler to the politically extreme than to political moderates. *Social Psychological and Personality Science*, *8*, 612–622.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, *27*, 415–444.
- Mischkowski, D., Glöckner, A., & Lewis, P. (2018). From spontaneous cooperation to spontaneous punishment—Distinguishing the underlying motives driving spontaneous behavior in first and second order public good games. *Organizational Behavior and Human Decision Processes*, *149*, 59–72.
- Park, J. H., & Schaller, M. (2005). Does attitude similarity serve as a heuristic cue for kinship? Evidence of an implicit cognitive association. *Evolution and Human Behavior*, *26*, 158–170.
- Pattyn, S., Rosseel, Y., & Van Hiel, A. (2013). Finding our way in the social world. *Social Psychology*, *44*, 329–348.
- Rand, D. (2016). Cooperation, fast and slow: Meta-analytic evidence for a theory of social heuristics and self-interested deliberation. *Psychological Science*, *27*, 1192–1206.
- Rand, D. G., & Nowak, M. A. (2013). Human cooperation. *Trends in Cognitive Sciences*, *17*, 413–425.
- Richerson, P., Baldini, R., Bell, A. V., Demps, K., Frost, K., Hillis, V., ... Ross, C. (2016). Cultural group selection plays an essential role in explaining human cooperation: A sketch of the evidence. *Behavioral and Brain Sciences*, e30.
- Riolo, R. L., Cohen, M. D., & Axelrod, R. (2001). Evolution of cooperation without reciprocity. *Nature*, *414*, 441–443.
- Romano, A., Balliet, D., Yamagishi, T., & Liu, J. H. (2017). Parochial trust and cooperation across 17 societies. *Proceedings of the National Academy of Sciences*, *114*, 12702–12707.
- Yamagishi, T., Jin, N., & Kiyonari, T. (1999). Bounded generalized reciprocity: Ingroup boasting and ingroup favoritism. *Advances in Group Processes*, *16*, 161–197.
- Zou, L. X., & Cheryan, S. (2017). Two axes of subordination: A new model of racial position. *Journal of Personality and Social Psychology*, *112*, 696–717.