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Homophily, Setbacks, and the Dissolution of Heterogeneous Ties: Evidence from Professional Tennis

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Abstract: Why do people engage with similar others despite ample opportunities to interact with dissimilar others? We argue that adversity or setbacks may have a stronger deteriorative effect on ties made up of dissimilar individuals, prompting people to give up on such ties more easily, which, over the long run, results in people forming ties with similar others. We examine this argument in the context of Association of Tennis Professionals tournaments, using data on 9,669 unique doubles pairs involving 1,812 unique players from 99 countries from 2000 to 2020. We find that doubles pairs with players from different countries are more likely to dissolve after a setback, especially if those countries lack social trust and connections with one another; this reality further contributes to the individual player's increased tendency to collaborate with same-country players in the next tournament. Our study has direct implications for interventions for diversity and inclusion.

Keywords: homophily; setbacks; tie dissolution; social networks; diversity

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DESPITE rapid episodes of globalization, the world remains segregated (Zhou 2011; Freeman and Huang 2015; Bremmer 2018; Bai, Ramos, and Fiske 2020). Modern technologies—air transportation, cell phones, and the Internet and social media platforms—have substantially reduced the costs of connecting with others, allowing us to interact with those from a distant culture who have different ideologies, norms, and ways of doing things. Yet homophily prevails in almost every aspect of our social and economic lives (McPherson, Smith-Lovin, and Cook 2001; Kossinets and Watts 2009). We continue to talk to people from the same culture in social settings offline (Ingram and Morris 2007) and online (Hofstra et al. 2017) and to form professional relationships with those with affinity to us (Reagans 2011; Dahlander and McFarland 2013), even as the world around us becomes far more diverse (Smith, McPherson, and Smith-Lovin 2014).

Why do people keep engaging with similar others despite no shortage of opportunities to interact with those who are different? Traditionally, scholars have focused on how relational networks are homogenized by agents' selection modes at the time of tie *formation* (Shrum, Cheek, Jr., and Hunter 1988; Kossinets and Watts 2009; Wimmer and Lewis 2010). These studies conclude that homophily prevails either because it is convenient to form ties with similar others (selection by "propinquity") (Bossard 1932; Reagans 2011) or because it is beneficial to do so (selection by "utility") (Ahuja, Polidoro, Jr., and Mitchell 2009; Hegde and Tumlinson 2014; Greenberg and Mollick 2017). More recently, scholars are increasingly interested in tie *durability* beyond formation. For example, Dahlander and McFarland (2013) have highlighted that the factors that motivate people to form ties may differ from

the factors that sustain those ties; in particular, tie persistence relies on "familiar people . . . reflecting on the quality of their relationship and shared experiences." This implies that tie durability hinges on participants being able to envision the long-run gains or rewards of that relationship. However, it remains unclear whether perceived benefits that permit tie persistence vary across ties made up of individual members who are more similar or less similar to one another. This calls for a deeper understanding of whether homogeneous or heterogeneous relationships are more prone to dissolving—a question we address in this article.

By extending the literature on the antecedents of tie dissolution, our article offers a novel explanation of the origin of homophily, which we call the "experiential origin of homophily." More specifically, we contend that because network structures change dynamically over time, the durability of previous ties affects *whether and when* people form new ties and that their experience in those previous ties affects *how and with whom* they form new ties. This perspective is especially relevant in repeated games in which individuals can decide whether to keep, churn, or forgo ties with their current transaction partners (Zhang 2017). In line with this logic, we argue that an important yet overlooked explanation of why homophily prevails might simply be that ties formed between dissimilar individuals are more vulnerable to dissolution—especially in the face of adversity. In other words, although people might have become generally more open to forming ties with dissimilar others nowadays, such ties are more susceptible to negative cues than homogeneous ones are, prompting people to "give up" more easily on them. This negative experience with dissimilar others then makes people more inclined to form homogeneous ties in the future. As a result, homophily could, over time, prevail not *despite* people's exposure to others who are different from themselves but—ironically—*because* of it.

We test our argument in the context of top-tier tennis doubles tournaments from 2000 to 2020, using granular data on 1,812 Association of Tennis Professionals (ATP) tennis players from 99 countries to investigate their propensity to (a) dissolve relationships with their doubles partners from one tournament to the next and subsequently (b) switch to same-country partners in the next tournament. As partner-switching from one tournament to the next is common in ATP doubles, we are able to observe repeated interactions among players, which is ideal for measuring tie persistence and dissolution. ATP doubles players not only come from a wide range of cultural and ethnic backgrounds but also build a variety of partnerships, both with partners from the same country or culture and with partners from a different country or culture. The ATP doubles data, by providing objective and granular data on individuals' demographics and productivity, allow us to tease apart how tie formation and persistence arise from demographic versus productivity differences (Kim and King 2014; Zhang 2017). This, in turn, allows us to control, to the best of our ability, for each pair's productivity differences—such as differences in ranking, age, height, and numbers of years playing together—which might increase their likelihood of continuing to collaborate.

We find that, compared with same-country pairs, cross-country pairs are more likely to dissolve after setbacks—measured by either (a) a loss in the first round of a tournament or (b) a close loss in the third set of the first round. Further evidence suggests that those who walked away from cross-country pairs were then

more likely to pair with players from the same country, an effect that is especially strong among those who experienced a setback compared with those who did not. Mechanism tests suggest that our findings could be better explained by a lack of mutual trust or social connectivity between the players' originating countries than by communication barriers due to lack of a common language.

Our findings provide direct implications for interventions aimed at promoting diversity among homogeneous groups. Traditionally, these interventions have favored a "mix-and-match" approach to increase the chances of dissimilar others meeting and interacting (Ingram and Morris 2007), but our article suggests that such an approach may not be sufficient, especially if we factor in the long-run persistence of heterogeneous relationships once they are formed and the participants' experiences of such relationships. Central to our argument is that negative performance feedback or signals may vary in their influence on group cohesion, which subsequently affects how durable interpersonal relationships can be. We find statistically significant evidence that heterogeneous relationships could be more prone than homogeneous ones to dissolution after a setback. It is thus not surprising to observe people eventually turning to similar others even if they begin with partners who are different from themselves—an outcome that is precipitated by the vulnerability of a diversified team as exemplified through setbacks. Future interventions for diversity promotion should therefore be designed to strengthen the resilience of cross-country teams, in particular, by giving them the tools to overcome setbacks by increasing mutual trust, rather than by simply creating more opportunities for them to encounter each other.

Theoretical Development

Tie Formation and Dissolution

Sociologists' long-standing interest in understanding why homophily prevails (Shrum et al. 1988; Kossinets and Watts 2009; Wimmer and Lewis 2010) has produced rich evidence for two mechanisms for the occurrence of homophily at the tie-formation stage (Skvoretz 2013; Stadtfeld, Hollway, and Block 2017; Melamed et al. 2020). Affiliating with similar others ("similar attracts") might simply be easier or more convenient (selection by "propinquity") (Bossard 1932; Reagans 2011), or it might be more beneficial (selection by "utility") (Ahuja et al. 2009; Hegde and Tumlinson 2014; Greenberg and Mollick 2017). Both mechanisms have been extensively studied with respect to how people are divided along race and ethnicity (Smith et al. 2014, 2016; Hofstra et al. 2017; Leszczensky and Pink 2019; Park 2021).

More recently, sociological views have expanded to understand the evolution of ties by highlighting behavior patterns that might differ between tie formation and tie persistence. Notably, by applying an actor-oriented model, network scholars have proposed structural ways to predict how social actors form or forgo ties across a variety of situations, including tie formation and tie maintenance (Snijders et al. 2005; Fitzhugh and DeCostanza 2018). A key takeaway in this tradition is that the antecedents of tie formation and tie persistence could be qualitatively different (Kleinbaum 2018). For instance, Juhász and Lengyel (2018) showed that

although geographical proximity increases the probability of tie creation, it does little to influence tie persistence, and that cognitive proximity may contribute to tie persistence, but only when both parties are loosely connected through a common third party. Dahlander and McFarland (2013), studying research collaboration, found that, relative to tie formation, tie persistence occurs among familiar others in which "people apply long-term strategies to make substantive assessments of a relationship's worth so as to draw extended rewards from the association" (P. 71). These studies build a solid foundation that enabled us to understand what prompts people's decision-making at various stages of an interpersonal relationship.

One stream of research particularly relevant to our own concerns the vulnerability of different kinds of ties—particularly those of individuals lacking common ground. As established by McPherson et al. (2001), ties between dissimilar individuals tend to dissolve more quickly, which could precipitate the formation of "niches (localized positions) within social space" (P. 415). In their review on the dynamics of network relationships, Rivera, Soderstrom, and Uzzi (2010) concluded that tie durability is shaped by the compatibility and complementarity of the actors' attributes. It is therefore natural to infer that individuals who differ from one another may perceive it to be especially costly to sustain their relationships, compared with the cost of homogeneous ties. This points to an interesting but still unanswered question: what are the likely antecedents of heterogeneous ties in maintaining their relationships, and how does the absence of such antecedents contribute to the dissolution of such ties?

The Deteriorative Effect of Setbacks on Ties

We highlight the important role of setbacks in breaking down heterogeneous relationships—a linkage not yet explicitly established by prior scholars. Broadly speaking, setbacks are instances in which an individual or organization attempts but fails to reach a goal. Research in psychology offers a wealth of evidence on why people cope with setbacks differently—generally attributing the variation to individual differences, such as personality traits (Carver and Connor-Smith 2010), vulnerability factors (Belsky and Pluess 2009), and risk preference and resilience (Masten et al. 1999; Noltemeyer and Bush 2013). These studies also imply behavioral consequences of having been exposed to adverse situations. For example, Weiss and Sherman (1973) suggested that, after a failure, some people may decrease their expectations of future success more than others. The consequences of setbacks aren't always negative; for example, people may develop resilience (Dumais 2005; Seery et al. 2013) and may even show post-traumatic growth (Maitlis 2020).

The recognition that more-resilient individuals can cope better with setbacks is closely related to the question we seek to answer in this research. The focus of our argument, instead, is tie resilience independent of the resilience of the individuals. We suspect that some ties might be less resilient than others to incidents such as setbacks for at least two reasons. First, certain ties could be more susceptible to setbacks if they lack social capital between individual members, which is key to sustaining trust, mutual understanding, and shared values and therefore helps bind human networks and facilitate coordination (Coleman 1988; Putnam 1995).

Without mutual trust and understanding, an interpersonal relationship is likely to break. It turns out that one of the most salient attributes of heterogeneous ties is that the individual members often come from different cultures, nations, or ethnic backgrounds and may, therefore, tend to share less social capital than otherwise and thus be more prone to dissolution. For this reason, we expect that, after a setback, tie members with less common ground may find it difficult to build or rebuild trust. Second, certain types of ties could be more vulnerable to setbacks if it is more difficult for the members to communicate about what went wrong so as to avoid such setbacks in the future. In heterogeneous relationships, language barriers could make such communication and repair even more difficult (Hoang 2018; Brynjolfsson, Hui, and Liu 2019). A recent study on network ties drawn from thousands of Yelp reviewers (Kovacs and Kleinbaum 2020) finds that similarity in linguistic style is associated with a higher likelihood of friendship persistence. In line with this logic, cross-country pairs could face greater linguistic challenges that lead them to dissolve through misunderstanding. Both mechanisms—social capital and communication—imply that heterogeneous relationships could lack the kind of resilience that would preserve them in the face of setbacks. We therefore hypothesize:

> **Hypothesis 1 (H1):** *After setbacks, heterogeneous ties are more likely to dissolve than homogeneous ones.*

The Experiential Origin of Homophily

We now go back to our original interest in homophily to offer a novel explanation of why homophily prevails: given that setbacks tend to have a greater deteriorative effect on heterogeneous ties, we expect individuals who have experienced setbacks to behave differently in their future choice of tie partners. In other words, although these people could consider dissimilar others as potential partners, they may hold back from doing so after having experienced a setback. We call this the *experiential* origin of homophily. Importantly, the strength of this effect may vary depending on how individuals "perceive" their own experience; thus, objectively identical setbacks might produce in different individuals a different change in the propensity to form ties with similar others.

Our theory broadens the literature on homophily in two ways. First, rather than treating tie formation and dissolution as separate events, we bring them together by proposing one avenue by which the decision to enact the former might affect the propensity to enact the latter. That is, by assuming that individuals "learn" from prior experience, we highlight the usefulness of using an individual's previous relationships to understand why homophily prevails. Although our argument is rooted in existing explanations of homophily—specifically, in their implicit assumption that individuals are active learners who apply lessons from previous experience to future decisions (Dahlander and McFarland 2013)—we go beyond prior explanations of the antecedents of homophily, in which individuals' choice functions are calculated by (a) transaction costs (Gerber, Henry, and Lubell 2013; Lewis and Swaminathan 2021); (b) ease of communication (McCroskey, Richmond, and Daly 1975); or (c) taste-based preferences with respect to gender or race (Tuma

and Hallinan 1979; Ruef, Aldrich, and Carter 2003; Greenberg and Mollick 2017; Zeltzer 2020), religion (Leszczensky and Pink 2017), education (Skopek, Schulz, and Blossfeld 2011), and geographical proximity (Juhász and Lengyel 2018). We build on these rich studies to argue that not only might there be *structural* reasons for homophily, as proposed in the literature (Feld 1982; Rivera et al. 2010), but there might also be *situational* reasons, whereby individuals' propensities to form ties with similar versus dissimilar others vary depending on those individuals' experiences.

Second, we add a new element—adversity or setbacks—to the homophily literature by establishing the relationship between negative performance feedback and partner choice. Going one step further, we leverage the subjective nature of negative cues to clarify why homophily might be more likely to prevail among dissimilar individuals than among similar individuals after experiencing "identical" events. Studies have established the subjective nature of setbacks as an experience and how that subjectivity varies across individuals (Atkinson and Litwin 1960; DeCharms and Dave 1965; Moulton 1965). Yet these studies don't explain how ties evolve when performance outcomes are ambiguous or subjective (Ertug et al. 2018, 2022). We extend this stream of literature to argue that individuals in heterogeneous relationships may interpret such experiences as more negative, which in turn increases their likelihood of subsequently avoiding such relationships. Because "in-group" members are more likely to attribute errors to "out-group" members in the face of negative performance feedback (Wilder 1990; Ilgen and Davis 2000; Chen, Brockner, and Chen 2002; Garcia et al. 2005; Zourrig, Chebat, and Toffoli 2015), we expect such corrective action—with respect to future partner choice—to be more likely among individuals in heterogeneous relationships. We therefore hypothesize:

> **Hypothesis 2 (H2):** *After setbacks, people who were previously in heterogeneous ties become more likely to form future ties with similar others, relative to people who did not experience setbacks.*

Data and Methods

Our primary data contain information on all players who competed in ATP doubles tournaments from 2000 to 2020 (such as ranking, nationality, age, and height) and their performance outcomes (such as wins, losses, and scores). We extracted these data from a repository maintained by Jeff Sackman, for which data collection stopped in March 2020, right before COVID-19 lockdowns led to large-scale tournament cancellation. ATP doubles matches are played by professional male tennis players around the world. These athletes compete both for prize money and to earn points that boost their ranking. Rankings are calculated by the points earned by each individual player in ATP-certified matches over the preceding 52 weeks and determine whether a player is qualified to enter and seed in doubles tournaments. In tennis, a doubles pair that wins the first two sets wins the match, but if the first two sets are split one to one, the pair plays either a regular third set or a 10-point tiebreaker. We assume pairs that win or lose in the third set to be highly comparable in their competitiveness, allowing us to use the third set or tiebreaker

as a placebo test. This rationale is in line with Buser and Yuan (2019), in which the match outcomes can be considered as exogenous, conditioned on performance differences in the first two sets—especially after controlling for the players' own rankings.

We use linear regression models at the player-pair level. The models include year, month, and player fixed effects to account for both time-invariant player characteristics and overall temporal shifts. Our analytical strategy has potential endogeneity concerns: certain characteristics of individual players can be correlated both with the team's decision to continue collaborating and the two members' cultural ties. For example, a cross-cultural team might be more likely to perform worse due to higher barriers to communicating with and trusting each other and might therefore be more likely to switch partners after a bad competition outcome. To alleviate such concerns, we conduct a placebo test in which we compare teams with a close win or loss in the third set in order to study the differences between same-country and cross-country teams with respect to their likelihood of tie persistence, conditioning on their competency.

Results

Homophily and Tie Persistence

We first compare the persistence of homogeneous ties with that of heterogeneous ties. As shown in Figure 1, the proportion of same-country pairs rises with the number of tournaments played by each player pair. This is unlikely to be an artifact of performance differences between these two types of pairs; as shown in Figure 2, the probability of winning the first game of a tournament is similar for cross-country and same-country pairs. Thus, we identify a key puzzle: despite negligible productivity differences, cross-country ties are more likely to dissolve. Why should that be?

Setbacks as a Precursor to Tie Dissolution

We begin testing our hypotheses by exploring whether cross-cultural pairs are more likely to switch partners after losing in the previous tournament. For this analysis, we constructed a pair-level panel of 9,660 unique player pairs that participated in a total of 1,355 tournaments or 26,387 matches. Each tennis tournament typically involves at least three rounds of matches, with the winning pair of one round advancing to the next round while the losing pair is eliminated. Table 1 reports the descriptive statistics and correlation table of our pair-level data. We identify the last ATP doubles match in which two given players played as a team and identify *tie dissolution* as a subsequent event.

We come up with two ways to capture the adversity or negative performance feedback experienced by players. To start with, we measure each pair's *overall performance* by the number of matches it wins in each tournament. An average pair wins a little less than one match, with nearly 50 percent of the pairs eliminated from each tournament after the first round. Alternatively, we measure *setbacks*

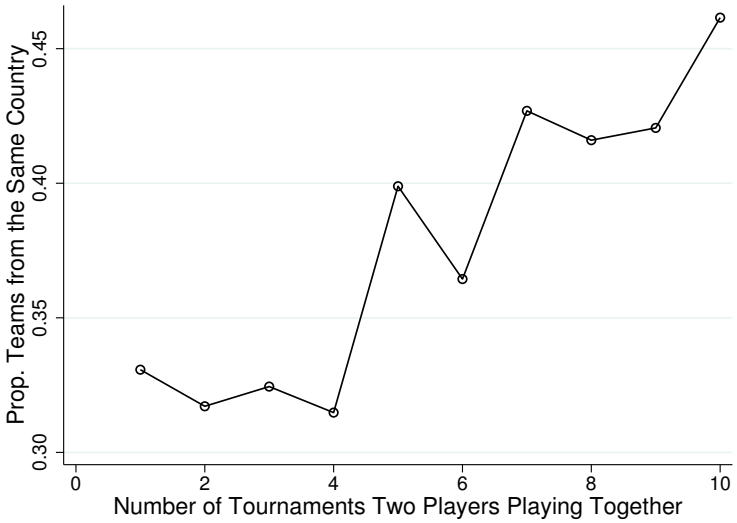

Figure 1: Tie persistence and homophily in ATP doubles. *Note:* The above graph illustrates the association between tie persistence (measured by how many tournaments a pair plays together) and homophily (the proportion of same-country pairs across all pairs). As pair duration rises, so does the likelihood of a given pair being made up of players from the same country. This provides evidence for the positive relationship between homophily and tie persistence. To exclude extreme cases, we limit our sample to player pairs that have played no more than 10 tournaments together (91.8 percent of all pairs). ($N = 8,877$. Source: Panel A of Table 1.)

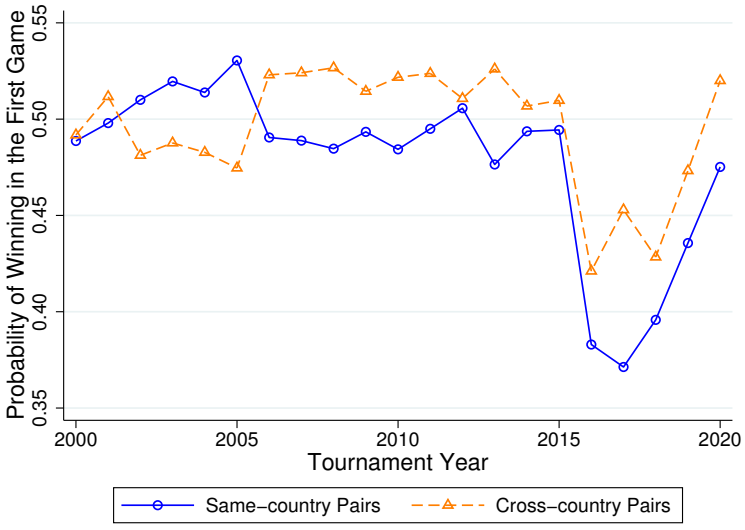

Figure 2: Comparing productivity differences across different types of tie. *Note:* The figure describes the probability, over time, of winning the first game of a match for same-country ties versus cross-country ties. ($N = 27,713$. Source: Panel A of Table 1.)

Table 1: Summary statistics and correlation

Panel A: Player pairs

	Mean (SD)	Range	*N*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Probability of tie persistence	0.65 (0.48)	0.00 to 1.00	27,713	1.00									
Overall performance	0.91 (1.12)	0.00 to 6.00	27,713	0.24	1.00								
Cross-country ties	0.55 (0.50)	0.00 to 1.00	27,713	−0.15	0.01	1.00							
Cross-country ties × overall performance	0.51 (0.95)	0.00 to 6.00	27,713	0.10	0.66	0.48	1.00						
Losing in the first round	0.51 (0.50)	0.00 to 1.00	27,713	−0.20	−0.76	−0.01	−0.50	1.00					
Cross-country ties × losing in the first round	0.28 (0.45)	0.00 to 1.00	27,713	−0.21	−0.46	0.56	−0.28	0.61	1.00				
Scores different in the third set	−0.35 (8.25)	–24.00 to 24.00	10,207	0.12	0.61	0.00	0.38	−0.81	−0.47	1.00			
Pairs' average ranks (log)	4.20 (1.24)	0.00 to 7.56	26,711	−0.40	−0.33	−0.11	−0.25	0.23	0.06	−0.12	1.00		
Pairs' average ages (log)	3.36 (0.14)	2.77 to 3.79	27,666	0.14	0.16	0.24	0.21	−0.11	0.07	0.04	−0.50	1.00	
Number of years playing together (log)	0.86 (0.79)	0.00 to 3.04	27,713	0.60	0.24	−0.36	−0.05	−0.17	−0.29	0.10	−0.45	0.13	1.00

Panel B: Individual players

	Mean (SD)	Range	*N*	(1)	(2)	(3)	(4)	(5)	(6)
Same-country ties	0.45 (0.50)	0.00 to 1.00	55,032	1.00					
Overall performance	0.91 (1.12)	0.00 to 6.00	55,032	−0.01	1.00				
Same-country ties × overall performance	0.40 (0.87)	0.00 to 5.00	55,032	0.51	0.57	1.00			
Scores different in the third set	−0.30 (8.23)	–24.00 to 24.00	20,289	−0.00	0.61	0.37	1.00		
Player's age	28.93 (4.63)	15.29 to 47.67	54,989	−0.20	0.13	−0.02	0.03	1.00	
Player's rank (log)	4.13 (1.29)	0.00 to 7.71	53,758	0.11	−0.32	−0.15	−0.12	−0.44	1.00

using the third-set result in the first round of each tournament, which allows us to apply a placebo test. To be specific, we consider it a close win (lose) if a pair wins (loses) in the third set in its first-round match. Our primary interest is not in the discontinuity itself, but in the cultural-tie differences in the discontinuity—that is, the differences between homogeneous and heterogeneous ties in the effect of losing on the likelihood of tie dissolution. We later discuss the validity of this methodology by leveraging granular data on the third-set point differences.

We proceed to test H1 and show results in Table 2. We begin by examining the association between *overall performance* and tie persistence. In all models, we control for each pair's log average rank and age and the number of years each pair plays together, as those characteristics might affect the individual players' performance and subsequently affect the likelihood of continuing to play together. We find that athletes who have played with one another longer are more likely to keep doing so; pairs that have lower ranking or whose members are older are more likely to dissolve. Consistent with our intuition, better performance significantly increases a pair's likelihood of continuing to play together. However, this positive relationship is explained away after we add the *cross-country* dummy. In models (2) and (4), the risk of tie dissolution varies across same-country versus cross-country pairs of various performance. Given that an average pair wins about one match per tournament, we consider below-average performance (winning no matches) as negative performance feedback. As shown, cross-country pairs are about six percentage points more likely to dissolve if they finish a tournament with no game won than are same-country pairs. This finding remains consistent after we include player-level fixed effects, although the average moderating effect of *cross-country ties* on the effect of *overall performance* is almost halved. We visualize this effect in Figure 3: among pairs losing in the first round (or winning no matches in a given tournament)—nearly 60 percent of participating pairs—cross-country pairs are, on average, four percent less likely to continue pairing than same-country pairs are. Thus, H1 is supported.

To further tease out the effect of setbacks on subsequent collaboration in order to come closer to causality, we apply a placebo test. As discussed, one endogeneity concern may be that same-country pairs could perform better than cross-country pairs from the start. One way to alleviate this concern is to examine our projected theory on third-set close wins, assuming that winning or losing a third set can be slightly more independent of a pair's true quality. In Table 3, we begin by showing the main effect of losing on the declining likelihood of tie persistence (model (1)), then examine the effects of losing for cross-country versus same-country pairs (model (2)). We were able to replicate the earlier finding that cross-country pairs are about four percentage points less likely to continue playing together if they lose the first round. In model (3), we add the performance differences in the third set; the results hold. We plot this effect in Figure 4, where we see that losing in the third set reduces the likelihood of tie persistence. In Figure 5, we further break down this effect and find a sizeable drop—at the cutoff—in the likelihood of tie persistence for cross-country pairs but less so for same-country pairs. Overall, these results increase our confidence in setbacks having a more profound deteriorative role on cross-country than on same-country pairs.

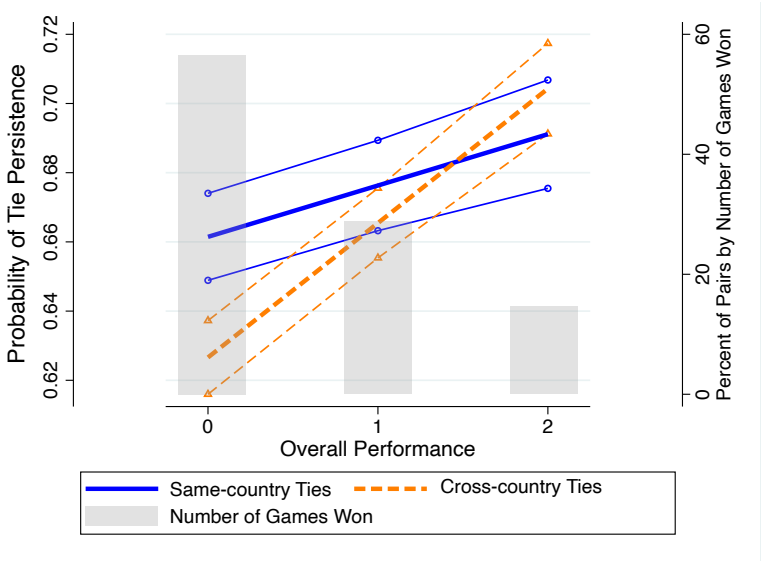

Figure 3: How tie persistence varies across pairs of varying performance. *Note:* The figure reflects the finding, from model (4) of Table 2, that overall performance in the previous tournament predicts the probability of tie persistence in the next tournament across same-country versus cross-country pairs. We also include the distribution of overall performance, in which we consider adversity or negative performance feedback as the equivalent of a pair achieving lower-than-average overall performance. ($N = 27,713$. Source: Panel A of Table 1.)

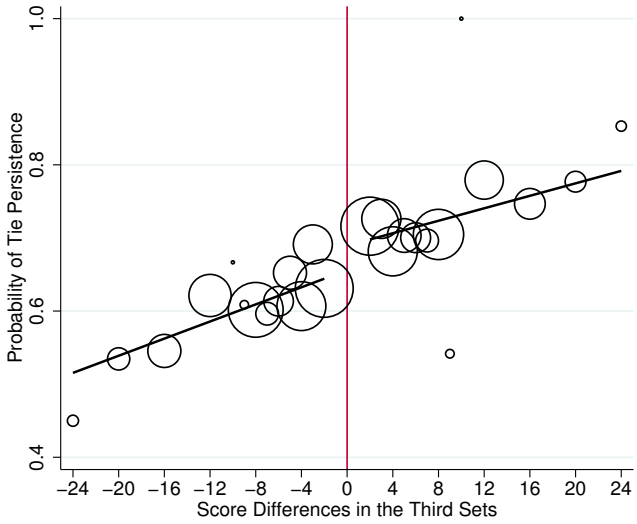

Figure 4: Placebo test: Overall effect on all ties.

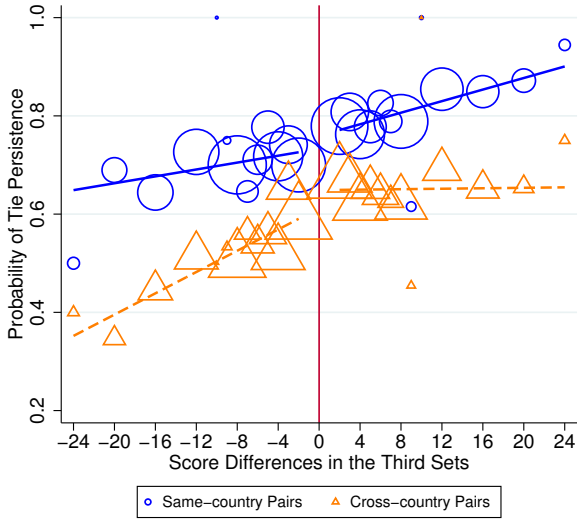

Figure 5: Placebo test: Varying effect across different ties. *Note:* The x axis shows the score differences between each pair in the close third sets. To normalize the scores, we multiply the point differences of a regular third set by four so that they are comparable to a 10-point tiebreaker. The y axis shows the probability of pairs in a certain bin to continue to play together in the next tournament. Figure 4 shows a scatter plot of all pairs within a range of 24 from the cutoff score and a linear fit of the data. Figure 5 separates the scatter plot for same-country and cross-country pairs. The size of the markers is proportional to the number of pairs in that particular bin. ($N = 10,207$. Source: Panel A of Table 1.)

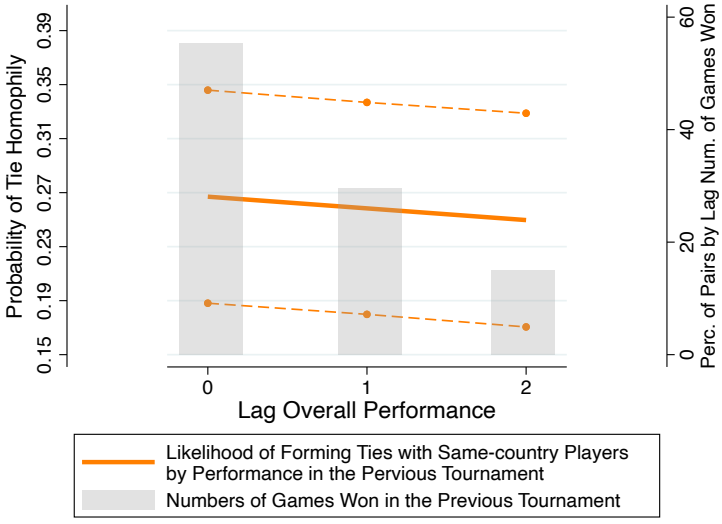

Figure 6: How tie persistence varies across individual players of varying previous performance. *Note:* The figure reflects the findings from model (3) of Table 4, illustrating how overall performance in the previous tournament predicts the probability of forming same-country ties in the next tournament across individual players who previously played in same-country versus cross-country teams. We also include the distribution of lag overall performance, in which we consider adversity or negative performance feedback as the equivalent of a pair achieving lower-than-average overall performance. ($N = 9,277$. Source: Panel B of Table 1.)

Table 2: Linear estimation predicting tie persistence

	Full sample			
	(1)	(2)	(3)	(4)
Overall performance	0.0276†	−0.00382	0.0278†	0.0142†
	(0.00302)	(0.0111)	(0.00217)	(0.00262)
Cross-country ties		−0.0233*		−0.0327†
		(0.0104)		(0.00955)
Cross-country ties × overall performance		0.0551†		0.0241†
		(0.0176)		(0.00425)
Pairs' average ages (log)	−0.0449	−0.0587	−3.324†	−3.299†
	(0.0632)	(0.0556)	(0.342)	(0.341)
Pairs' average ranks (log)	−0.0605†	−0.0584†	−0.0516†	−0.0525†
	(0.0149)	(0.0148)	(0.00479)	(0.00476)
Number of years playing together (log)	0.307†	0.318†	0.398†	0.394†
	(0.0230)	(0.0184)	(0.00762)	(0.00797)
Observations	26,705	26,705	26,073	26,073
R^2	0.388	0.393	0.496	0.497
Fixed effects:				
Year	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes
Player 1			Yes	Yes
Player 2			Yes	Yes

Notes: Standard errors in parentheses. $* \ p < 0.05$, † $p < 0.01$.

We use a continuous measure, *cultural distance*, as an alternative to the binary variable for cross-country pairs in order to check the validity of our findings. Because our measure of same- or cross-country ties is agnostic to the differences between the two players, it may absorb the granularity of how heterogeneous a tie can be—which is the key to our conceptualization. We therefore come up with a set of continuous variables to capture *cultural distance*, using a multi-dimensional scale developed by cultural distance theory to capture the degree to which norms and values differ from one country to another (Hofstede 2001). In column (1) of Table S.1 in the online supplement, we begin with an analysis using principal components of the six-dimensional scale as the moderator; then in columns (2) to (7), we break it down by each individual component: power distance, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance, long- versus short-term orientation, and indulgence versus restraint. To be exact, each dimension of the cultural distance variable captures the degree to which two players differ, as measured by that scale, which we then interact with *overall performance* in the model to predict tie dissolution. We find strong evidence that player pairs with larger cultural distances are more susceptible to negative performance, which further validates our main effect.

Table 3: Placebo test: Linear estimation predicting tie persistence

	Close match		
	(1)	(2)	(3)
Losing in the first round	−0.0414†	−0.0204	0.00699
	(0.00766)	(0.0110)	(0.0165)
Cross-country ties		0.0416*	0.0431*
		(0.0188)	(0.0189)
Cross-country ties × losing in the first round		−0.0374*	−0.0399*
		(0.0166)	(0.0170)
Pairs' average ages (log)	−0.0838	−0.0926	−0.0847
	(0.0573)	(0.0553)	(0.0562)
Pairs' average ranks (log)	−0.0653†	−0.0627†	−0.0612†
	(0.0124)	(0.0131)	(0.0133)
Number of years playing together (log)	0.315†	0.322†	0.323†
	(0.0207)	(0.0186)	(0.0186)
Scores different in the third set			0.00204*
			(0.000795)
Observations	10,192	10,192	9,892
R^2	0.377	0.378	0.378
Fixed effects:			
Year	Yes	Yes	Yes
Month	Yes	Yes	Yes

Notes: Standard errors in parentheses. $* \ p < 0.05$, † $p < 0.01$.

Patterns of New Tie Formation

For H2, we look at individual players' tie-formation choices after tie dissolution to examine if the likelihood of forming a same-country pair increases. We use the individual-level panel of 1,812 unique players. We construct a binary variable, *same-country ties*, indicating whether or not the next tie a player forms has the same country of origin he does. As shown in Table 4, we find that, as a baseline, players who previously played with someone from a different country are less likely to switch to playing with a same-country partner in subsequent tournaments. The effect is negatively moderated by whether or not they have experienced setbacks (models (1) and (2)) and continues to hold if we limit the sample to close-win matches and control for score differences in the third set (models (3) to (5)). To visualize this effect, Figure 6 plots tie-forming patterns of individuals who were previously in cross-country ties. Consistent with H1, when we plot the distribution of overall performance, roughly 60 percent of players finish the tournament with no wins; these players are, on average, three percent more likely to form ties with same-country players than are players who have won at least two matches in the previous tournament. Thus, we find support for H2.

Table 4: Likelihood of homophily after setback: Individual players

	Full sample		Close match		
	(1)	(2)	(3)	(4)	(5)
Cross-country ties (lagged)	−0.412†	−0.384†	−0.450†	−0.415†	−0.414†
	(0.00690)	(0.00707)	(0.0110)	(0.0116)	(0.0118)
Overall performance (lagged)	0.0207†	0.0214†	0.0206†	0.0201†	0.0191†
	(0.00338)	(0.00340)	(0.00546)	(0.00555)	(0.00566)
Cross-country ties (lagged) × overall performance (lagged)	−0.0307†	−0.0321†	−0.0287†	−0.0286†	−0.0278†
	(0.00431)	(0.00433)	(0.00694)	(0.00706)	(0.00719)
Scores different in the third set					0.000357
					(0.000484)
Player's age	−0.00610†	0.113	−0.00756†	−0.133	−0.181
	(0.00116)	(0.108)	(0.00161)	(0.174)	(0.179)
Player's rank (log)	0.00308	0.000999	0.0113*	0.0105	0.0102
	(0.00347)	(0.00378)	(0.00545)	(0.00624)	(0.00634)
Observations	24,721	24,721	9,532	9,532	9,277
R^2		0.191		0.220	0.218
Fixed effects:					
Year	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes
Player		Yes		Yes	Yes

Notes: Standard errors in parentheses. $* p < 0.05$, † $p < 0.01$.

Mechanisms

Why are cross-country ties more susceptible to setbacks? We explore the two mechanisms theorized earlier to understand what underlies the interaction between setbacks (as negative performance feedback) and country or cultural heritage.

Lack of social capital. As theorized earlier, one could attribute the tie-deteriorating effect of setbacks to dissimilar individuals lacking enough social capital. We therefore begin by testing the salience of this mechanism. Columns (1) to (4) of Table 5 show our mechanism tests on social capital, using the two players' country origins as reference. First, we proxy social capital with *bilateral trust*, measured as the extent to which people from one country trust people from another country. Methodologically, we follow Guiso, Sapienza, and Zingales (2004) on social capital, which is calculated based on surveys conducted by Eurobarometer. Specifically, respondents are asked "I would like to ask you (a question) about how much trust you have in people from various countries." The answers are then recorded on a scale of 1 to 4: 1 = a lot of trust; 2 = some trust; 3 = not very much trust; 4 = no trust at all. We reverse-code the answers to construct the variable *Bilateral Trust Index* so that a higher value indicates greater trust. To be exact, we pool individual responses from waves of Eurobarometer surveys—1970, 1976, 1980, 1982, 1986, 1990, 1991, and 1993 to 1997—which included the question on bilateral trust and then use the average value as our bilateral trust index. We replicate the model specifications used to test H1, adding *Bilateral Trust Index* as a moderator. Pairs with

Table 5: Mechanism: The role of social capital and common language

	Linear estimation predicting tie persistence					
	(1)	(2)	(3)	(4)	(5)	(6)
Overall performance	0.171†	0.139†	0.0979†	0.0607†	0.0410†	0.0361†
	(0.0489)	(0.0379)	(0.0158)	(0.00870)	(0.00515)	(0.00382)
Bilateral Trust Index	0.0758†	0.104†				
	(0.0209)	(0.0384)				
Overall performance × Bilateral Trust Index	−0.0449†	−0.0340†				
	(0.0150)	(0.0115)				
Social Connectedness Index (log)			0.00527*	0.00442*		
			(0.00234)	(0.00179)		
Overall performance × Social Connectedness Index (log)			−0.00658†	−0.00313†		
			(0.00152)	(0.000723)		
Common language					0.0330*	0.0224
					(0.0136)	(0.0152)
Overall performance × common language					−0.0225	−0.0135*
					(0.0161)	(0.00680)
Pairs' average ages (log)	−0.224†	−1.468*	−0.0455	−3.299†	−0.00545	−3.267†
	(0.0651)	(0.572)	(0.0660)	(0.355)	(0.0551)	(0.556)
Pairs' average ranks (log)	−0.0728†	−0.0407†	−0.0600†	−0.0519†	−0.0785†	−0.0429†
	(0.00980)	(0.00868)	(0.0155)	(0.00485)	(0.00896)	(0.00748)
Number of years playing together (log)	0.347†	0.407†	0.308†	0.402†	0.399†	0.463†
	(0.0142)	(0.0111)	(0.0254)	(0.00772)	(0.0194)	(0.0126)
Observations	8,327	8,047	24,226	23,643	14,021	13,650
R^2	0.417	0.513	0.387	0.500	0.415	0.516
Fixed effects:						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes
Player 1		Yes		Yes		Yes
Player 2		Yes		Yes		Yes

Notes: Standard errors in parentheses. $* \ p < 0.05$, † $p < 0.01$.

higher social trust are about four percentage points more (less) likely to continue to play together (to dissolve) after negative performance than pairs with lower social trust (Table 5, models (1) and (2)). This evidence suggests the salience of trust as a potential mechanism.

To understand the validity of social capital as a construct, we proxy it using an alternative measure—*social connection*—that is, the strength of connection between two countries, as represented by Facebook's *Social Connectedness Index*, which measures the relative probability of Facebook friendship between users in country $_i$ and users in country $_j$. We find a positive and significant effect of social connection between two countries on tie persistence after negative performance (Table 5, models (3) and (4)), consistent with what we found earlier using the *Bilateral Trust Index*. Taking results using both measures of social capital, we find support that social

capital—in the form of social trust or of social connections—might be a key mechanism explaining why heterogeneous relationship are more prone to dissolution after setbacks.

Communication barriers. As theorized earlier, we also suspect communication barriers as a potential mechanism. In columns (5) and (6) of Table 5, we test this mechanism using a dummy variable, *common language*, which equals 1 if the two players' origin countries have a common official language, as determined from Head, Mayer, and Ries (2010). First, we check the intervariable correlation between *common language* and the two measures of social capital, finding it moderate to high. The correlation of *common language* with *Bilateral Trust Index* (*Social Connectedness Index*) is 0.32 (0.55), even higher than the intervariable correlation between the two measures of social capital (0.16), suggesting that it might be challenging to tease apart mechanisms stemming from those communication barriers that are independent of social capital to begin with. We proceed with the regression models, using the same specifications as before. We find that although ease of communication is also positively correlated with tie persistence, this result is statistically significant only when player fixed effects are added (see model (6) vs. model (5) of Table 5). Considering the concern with intervariable correlation, we re-run the models, adding back the variable *Bilateral Trust Index* to models (3) to (6). We find a strongly significant interaction of *Social Connectedness Index* ($\beta = 0.01$, $p < 0.01$ for model (3); $\beta = 0.01$, $p = 0.008$ for model (4)), whereas that of *common language* is no longer significant ($\beta = 0.02$, $p = 0.6$ for model (5); $\beta = 0.009$, $p = 0.8$ for model (6)). We therefore conclude that social capital channeled through trust and social connections seems to be a more robust mechanism; it is safe to say that communication barriers alone are insufficient to explain why heterogeneous relationships are more prone to the deteriorative effect of setbacks.

Additional Robustness Checks

We conduct additional analyses to examine the sensitivity of our conclusions. First, we investigate the robustness of H1 using a more rigorous treatment; that is, we calculate score differences in the third set in a more conservative way, multiplying the point differences of a regular third set by two rather than, as in our main analysis, by four.[1] In Figure S.4 in the online supplement, we illustrate our findings using the revised treatment for score differences; our earlier conclusions hold, judging from the sizable drop at the cutoff for cross-country pairs but not for same-country pairs. This reinforces our confidence in our earlier conclusion that cross-country pairs react much more strongly to losing than same-country pairs do.

Second, we extend our analyses by relaxing our assumption on losing in the first round. To recap, our main analyses are primarily concerned with pairs that win or lose in the first round, because that condition best exemplifies our conceptualization of setbacks—namely, obstacles or disadvantages in a multi-round competition. However, it is unclear how performance in subsequent rounds contributes to decisions on tie formation or persistence. In Table S.2 in the online supplement, we show the effect of losing in the following rounds, using identifications similar to those used earlier. We find game outcomes in subsequent rounds to have a negative

but nonsignificant effect on tie persistence between same-country and cross-country pairs. To be exact, as fewer player pairs enter the following rounds, the cross-country pairs continue to be more likely to lose than same-country pairs, yet the magnitude of the difference decreases (models (3) to (8)). That said, it seems that losing in Round 5—typically the quarter-final, semifinal, or final stage of a tennis tournament—has an especially strong effect on tie dissolution (model (10)). Overall, these findings are consistent with our intuition that negative performance has a more negative effect on tie persistence for cross-country pairs than for same-country pairs.

Discussion

Why do people continue to flock with similar others even after gaining access to diversified networks? This article extends the literature to offer a new perspective on why homophily prevails (Rodan and Galunic 2004; Goerzen and Beamish 2005). Our perspective assumes that people form new relationships based on lessons learned from previous relationships. Importantly, ties made up of similar versus dissimilar individuals may react differently to the same experience; individual members without a common cultural heritage may find their relationship less resilient to negative performance feedback, making subsequent dissolution more likely. We find support for this argument in the context of professional tennis tournaments by observing, over a period of 20 years, how players form doubles pairs. After setbacks, cross-cultural pairs are not only more likely to dissolve but also more likely to form new ties with same-cultural players—even if the setbacks in their previous tournaments were marginal or "close calls." This effect persists after we control for players' differences in productivity along with other player- and team-level attributes. In our models, cross-country ties are about two to six percentage points more likely to dissolve than same-country ties are after negative performance. The negative effect persists and remains strong at four percentage points if we limit our sample to close-win third sets, where winning or losing is almost independent of individual productivity. Meanwhile, individuals who previously played with cross-country players are three percentage points more likely to switch to same-country partners after a negative performance.

Although modern technologies and organized efforts have significantly increased people's exposure to dissimilar others, it remains relatively little known whether ties are formed more frequently with dissimilar others and, if so, how durable those ties are. By showcasing our argument through a unique context—professional tennis—our broader aim is to highlight that homophily continues to be a conundrum in modern society in spite of how "connected" we technically *can* be. We believe the implications of our findings can be generalized well beyond competitive sports to many other contexts involving repeated interactions in social or professional settings. As many studies have uncovered, homophily or the prevalence of homogenous relationships can be problematic, in part because it reinforces the spiral of in-group knowledge exchange, leading to the creation of "innovation traps" by which fewer new ideas are proposed (Choi and Thompson 2005). This unwanted effect suggests a need to diversify team membership in

organizations, which has already been shown to increase innovation (Østergaard, Timmermans, and Kristinsson 2011; AlShebli, Rahwan, and Woon 2018). Recognizing how homophily may contribute to stratification and in-group silos, efforts have been made to curb the formation of homophily by creating opportunities for members of different groups to interact—for example, diversity mixers designed to break the walls between dissimilar individuals so they can develop relationships beyond established social boundaries. However, it remains questionable whether such a "mix-and-match" approach substantially increases communication or relationships across social groups (Ingram and Morris 2007). In light of our findings, future interventions for diversity promotion should consider factoring in the vulnerability of diverse teams. For instance, team-building exercises may integrate training components to increase mutual trust and social connectivity, which may not only increase the resilience of the teams themselves but also reduce homophily in the long run.

Notes

1 For each game in a regular set, the minimum point difference is two and the maximum is four. A set is won by the first side to win four points; however, if each player has won three points (or what is called "deuce" in tennis), there is a tie and one player must get two points ahead in order to win the game.

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