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Case Report

Beyond "birds of a feather": A social inference approach to attachment-dependent grouping

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ABSTRACT

Homophily—social grouping on the basis of similar traits—is a well-established intergroup dynamic. However, some evidence suggests that homophily emerges as a byproduct of people's inferences about desirable qualities (e.g. trustworthiness, openness to experience) in others. We apply this social inference approach to studying how people form groups on the basis of their attachment styles. In a behavioral tracking study involving large samples of strangers interacting in a sports stadium, we found that people affiliate with others who share their degree of attachment avoidance, but who do *not* share their degree of attachment anxiety. These findings are consistent with evidence that avoidantly attached individuals—but not anxiously attached individuals—display qualities they find desirable in others. It also suggests that accounts of intergroup behavior and social identity that treat similarity as an interpersonal goal might not capture the psychological processes behind group formation, and that a more nuanced social inference approach is needed to explain large-scale patterns of social grouping.

> "I don't want to belong to any club that will accept me as a member."
>
> —Groucho Marx

1. Introduction

Imagine that you are a socially anxious person entering a party, and nervously hoping to avoid an evening of uncomfortable small talk and awkward silences. Other guests have arrived before you, and are mingling around the living room. In one corner, you see a group of kindred spirits who are fidgeting and avoiding eye contact. In the other, you see a smiling group of strangers who wave and beckon you over. Which group do you join?

This dilemma alludes to a major social psychological question—do people search for similarity in their social groups, or do they search for qualities that they think are objectively desirable (Kalick & Hamilton, 1986)? Early studies in the social identity and interpersonal relationships literatures treated similarity as a potent interpersonal motive (Byrne, 1997; Palmer & Kalin, 1985; Tajfel, Billig, Bundy, & Flament, 1971), and there is evidence that large and small groups of strangers cluster based on similar traits (Bahns, Crandall, Gillath, & Preacher, 2016; Bahns, Pickett, & Crandall, 2011; Halberstadt et al., 2016). But other studies suggest that people do not seek out similarity per se from their social groups, but rather traits that they infer from similarity. For example, Jackson, Halberstadt, Jong, and Felman (2015) found that personality inferences mediate religious homophily (grouping based on shared religious identity), and studies on interpersonal attraction have shown that people seek out similar others because they believe that these partners will be trustworthy (Singh et al., 2009), and will like them in return (Condon & Crano, 1988).

This latter literature supports a "social inference" approach to homophily, in which a bias towards similar others is simply a byproduct of our search for desirable social qualities. Because people often believe they themselves have desirable social qualities (Robins & Beer, 2001), this search will frequently look like the pursuit of similarity, but the two should be separable. That is, there should be cases in which desirable traits are in fact associated with *dissimilar* others, in which people affiliate with others unlike themselves. Like Groucho Marx, people should sometimes avoid the clubs with members like them.

2. Adult attachment, social inference, and group formation

Adult attachment theory, which speaks directly to people's preferences for social relationships, provides an ideal framework in which to apply the social inference approach. Attachment theory assumes that people have stable styles of interacting with others, which are rooted in

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childhood experience (Hazan & Shaver, 1987, 1994), but also manifest in subtle social cues (e.g. body language and interpersonal distance; Fraley & Shaver, 1998; see Shaver, Schachner, & Mikulincer, 2005 for a review).

Attachment theorists have a particular focus on two types of "insecure" attachment styles: attachment avoidance and attachment anxiety. Individuals high in attachment avoidance often avoid intimacy and tend to distance themselves physically and emotionally. They also prefer these traits in their romantic and non-romantic relationship partners (Birnie, McClure, Lydon, & Holmberg, 2009; Mayseless & Scharf, 2007). Therefore, both similarity and social inference approaches predict that avoidants will seek out other avoidants in social groups.

In contrast, anxiously attached individuals have high desire for intimacy and closeness (Mikulincer & Selinger, 2001), but are ineffective caregivers themselves (Collins & Feeney, 2000), displaying cues that indicate low intimacy and self-disclosure (Grabill & Kerns, 2000). Perhaps as a result of these qualities, attachment anxiety is linked to low speed-dating success (McClure & Lydon, 2014, Study 1), and even when anxiously attached individuals show more social engagement and humor, they simultaneously communicate neuroticism and insecurity (Brumbaugh & Fraley, 2010). Therefore, if people high in attachment anxiety do indeed look for stable, warm, and secure caregivers (Simpson, Rholes, & Nelligan, 1992, p. 434), "similar others" are just the kind of people they would prefer to *avoid* and to the extent that anxiously attached individuals can interpret each other's social predilections, groups of anxiously attached individuals should be rare.

In the most systematic previous investigation on attachment matching, Klohnen and Luo (2003) found that people had a strong aversion to hypothetical insecurely (i.e., avoidantly or anxiously) attached partners, coupled with a small preference for hypothetical partners who share their own attachment style. However, beliefs about one's attraction in hypothetical contexts may not coincide with one's actual affiliative behavior (Eastwick & Finkel, 2008). Any critical test of the social inference approach should measure such behavior directly, and in contexts that simulate real group formation—for example, where individuals choose group members from many potential interaction partners who also might also be trying to approach or avoid them.

3. The present study

The present study uses a novel technique, "in-vivo behavioral tracking" (Jackson, Bilkey, Jong, Rossignac-Milon, & Halberstadt, in press) to examine attachment-driven affiliation in large-scale face-to-face contexts. We surreptitiously filmed a crowd of experimental participants during an experimental task in which they assembled themselves into groups, and used their attachment styles—measured prior to the day of the study—to predict which crowd members they would approach. Because avoidants, in theory, not only distance themselves during social interaction (Kaitz, Bar-Haim, Lehrer, & Grossman, 2004; Simpson et al., 1992), but also prefer partners who value such distance (Klohnen & Luo, 2003), both the similarity and social inference hypotheses predict attachment-based homophily: emergent groups should be more similar in their level of attachment avoidance than expected by chance. However, because anxiously attached individuals' interpersonal behavior is misaligned with their interpersonal preferences—they seek security and warmth but do not exhibit it—we also hypothesized attachment-based *heterophily*: emergent groups would be *dissimilar* in their level of attachment anxiety.

In a previous investigation of repeated group formation, Halberstadt et al. (2016) found that attractiveness- and gender-based homophily decreased over time. This may be because as people become more familiar with their grouping partners, they also become less dependent on superficial interpersonal and physical traits when picking grouping partners. We therefore hypothesized that homophily on the basis of attachment avoidance and heterophily on the basis of attachment anxiety would decrease over time.

Finally, we also measured interpersonal distance prior to the study, for use as a behavioral measure of distance preferences. We expected that this measure would mediate the relationship between individuals' attachment style and the attachment style of the groups they joined, suggesting that their desire for physical distance informed their affiliative decisions later in the study. However, since previous investigations have only linked attachment avoidance—but not anxiety—to interpersonal distance (Kaitz et al., 2004), we tentatively predicted that interpersonal distance would only mediate avoidance-based grouping.

4. Method

4.1. Participants

The current data come from a large in-vivo behavioral tracking study that was conducted in May 2014 to test four independent hypotheses concerning the earliest moments of group formation.[1] One hundred seventy-two (M_{age} = 21.43, SD = 4.50; 41 men, 130 women, 1 who identified as "other") individuals were recruited in Dunedin, New Zealand, through a student employment website. Given the novelty of in-vivo behavioral tracking, we could not confidently estimate an expected effect size for a formal a priori power analysis. Therefore, we had no explicit target sample size, but rather sought to recruit as many participants as possible in the period we had use of the stadium facility. However, given the effect size of Halberstadt et al.'s (2016) study on attractiveness-based matching (f^2 = 0.04), our sample was powered at .75 to detect significant effects at the α = 0.05 level.

Participants were explicitly instructed not to sign up with friends, and participants who indicated knowing another individual in their session were reassigned prior to participation. Participants were paid NZ$30 to cover any travel costs to the venue. All participants gave written, informed consent before participation and were fully debriefed after completing the study. They were also given the option (which nobody chose) to have their video data deleted from the sample.

4.2. Venue, equipment, and software for in vivo tracking

The study was conducted at the Forsyth-Barr Stadium, Dunedin, in four sessions over the course of a single day. An Elphel NC535 network camera was mounted 25 m overhead, and continuously captured video of the 30 m × 20 m experimental area for the duration of the study, at 30 frames/s at the full resolution of 2592 × 1944 pixels. The Theia SY110 lens used provides a 120° view with almost 0% distortion. Following data collection, individual participants were tracked using custom proprietary software developed by Animation Research Ltd. See Halberstadt et al. (2016) for more detail concerning this software, and for a description of how we translate the tracking data into measures of group membership and interpersonal proximity.

4.3. Measures

Prior to the day of the study, participants were emailed an online survey with a set of questionnaires relevant to the four hypotheses being tested, including Simpson's (1990) adaptation of Hazan and Shaver's (1987) adult attachment questionnaire, Rosenberg's (1965) measure of self-esteem, Luhtanen and Crocker's (1992) measure of collective self-esteem, Gómez and colleagues' (2011) measure of

[1] The other hypotheses concerned (a) the influence of ritual elements on group cohesion and cooperation, (b) the moderating role of individual and collective self-esteem on attitude-based grouping, and (c) the extent to which attractiveness and gender influence emergent social groups. While we do not discuss these other hypotheses in the current paper, we have explained them and listed the measures relevant to each hypothesis on the Open Science Framework (osf.io/fd7y5).

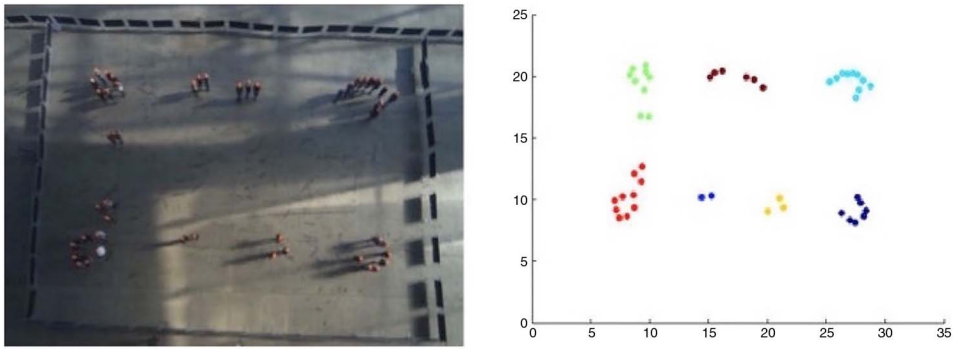

Fig. 1. Participants completing a group formation task in which they were asked to "get into groups of any size or composition" over several iterations. The left panel displays the overhead camera's view of one social group. The right panel displays MATLAB output, in which quantitatively derived groups are demarcated with different color.

identity fusion (with respect to the University of Otago community), and Conte, Weiner, and Plutchik' (1982) measure of death anxiety.

Simpson's (1990) measure of attachment style—the only measure that was included to test the current hypotheses—contains 13 items (4 reverse scored) to which participants rate their agreement using a 1–7 Likert scale anchored at 1 ("Strongly Disagree") and 7 ("Strongly Agree"). The original scale concerns participants' attitudes towards their romantic partner, but our version of the scale was intended to measure participants' attitudes towards their social relationships in general. Therefore, items referred to "others" rather than participants' romantic partners. Five of the items assessed anxious attachment (e.g. "Others are reluctant to get as close as I would like"); and eight assessed avoidant attachment (e.g. "Others often want to be more intimate than I am comfortable being").

Since the adapted scale concerned participants' general (rather than only their romantic) relationships, we confirmed its psychometric validity (Fabrigar & Wegener, 2016). As in Simpson, Rholes, and Philips (1996); see also Simpson et al., (1992), the scale loaded reliably onto two factors in a principal components analysis with varimax rotation. The first factor (explaining 26% of variance) contained high loadings (over .40) for all items designed to measure attachment avoidance, except for one ("I'm comfortable having others depend on me," reversed, .01), and the second factor (explaining 17% of variance) contained high loadings for all items designed to measure attachment anxiety.

Follow-up reliability analyses showed an initial Cronbach's alpha of .76 for items in the avoidance subscale. However, deleting the item that initially did not load onto the avoidance factor (item-total correlation = 0.06) resulted in a higher reliability of 0.80. Therefore, all items but this one were averaged into our avoidance subscale. The initial Cronbach's alpha for all anxious attachment items was .64. However, deleting one item with a low item-total correlation ("I rarely worry about others leaving me," reversed, item-total correlation = 0.19) resulted in a higher reliability of 0.70. All remaining items were averaged into our anxiety subscale.

4.4. Experimental procedure

Participants provided written informed consent on the day of the study, including general permission to appear anonymously on video (participants were not told about—and indicated no awareness of—the ceiling mounted camera until after the experimental procedure). They were next assigned an identification number, which they wore on an orange baseball cap (orange improved the contrast of their heads against the ground – see Fig. 1 – thereby minimizing tracking errors; participants were told that the cap's purpose was to make their participant number visible). After participants received their cap, a research assistant took pictures of each participant, which were later coded on a scale of 1–10 on physical attractiveness (Krippendorf's alpha = 0.75). Participants were then led, one-by-one in order of their participant number, into a 20 m × 30 m space marked off by 1 m high crowd control barriers.

Participants completed several activities over the course of the experiment, some of which were designed to test other hypotheses, and are explained at osf.io/fd7y5. Immediately after being led into the experimental area, participants were first asked to wait for five minutes prior to the ostensible start of the study, to provide a baseline interpersonal distance measure. Next, they were instructed to assemble by participant number around the periphery of the space, and then to "take five steps in and form groups of any size and composition," raising their hands when their group was established. Once stable groups were formed, participants were asked to form new groups, from their current positions, two more times, and then to repeat the entire process twice over, creating nine total observations (i.e., three replications of three trials).

After completing this grouping task, participants completed several other activities that are not related to the present investigation. Finally, they were paid and dismissed; they were given a full debriefing by email one week later.

4.5. Data processing

Following data collection, we extracted sets of image patches for each participant in each frame, and identified these patches in the subsequent frames using computer vision techniques, such as template and histogram-based matching. This procedure produced 30 x-y coordinates per second for each participant, which corresponded to participants' physical location for the entirety of the experiment.

Using a custom MATLAB routine, we converted participants' location information into our parameters of interest. During the waiting period, we calculated each participant's distance (in meters) to all other participants in the study, and then averaged these values into a general interpersonal distance metric. During the grouping period, we used a k-cluster means procedure coupled with a silhouetting algorithm to quantitatively derive discrete social groups based on the ratio of participants' proximity to group members vs. non-group members. Fig. 1 shows an overhead view of the study's grouping procedure, coupled with an image of social groups that we quantitatively derived using our custom script.

5. Results

Three participants did not fill out the attachment measure, and were not included in analyses. Participants' attachment avoidance (M = 3.18, SD = 1.05 and attachment anxiety (M = 3.19, SD = 1.09) scores were normally distributed (skewness < |.41|) with attachment anxiety values ranging from 1 to 6.20, and attachment avoidance values ranging from 1 to 5.67.

Table 1
Summary of multiple regression analysis of attachment-dependent grouping.

Variable	*b*	SE	*β*	*df*	*t*	Sig. (p)	f^2
Attachment avoidance model							
Attachment avoidance	**0.07**	**0.03**	**0.15**	**164**	**2.54**	**0.01**	**0.02**
Attachment anxiety	0.002	0.03	0.004	164	0.06	0.95	< 0.001
Gender	0.009	0.06	0.008	164	0.16	0.88	< 0.001
Attractiveness	− 0.001	0.02	− 0.003	164	− 0.05	0.96	< 0.001
Trial	− 0.00001	0.004	− 0.00001	1351	− 0.002	0.99	< 0.001
Attachment anxiety model							
Attachment avoidance	**0.07**	**0.02**	**0.16**	**164**	**3.49**	**0.001**	**0.02**
Attachment anxiety	**− 0.06**	**0.02**	**− 0.15**	**164**	**− 3.22**	**0.002**	**0.02**
Gender	0.01	0.04	0.01	164	0.25	0.80	< 0.001
Attractiveness	0.02	0.02	0.05	164	1.14	0.26	0.002
Trial	− 0.00001	0.004	− 0.00001	1351	− 0.002	0.99	< 0.001

Note. Bolded effects are statistically significant at the p < .05 level.

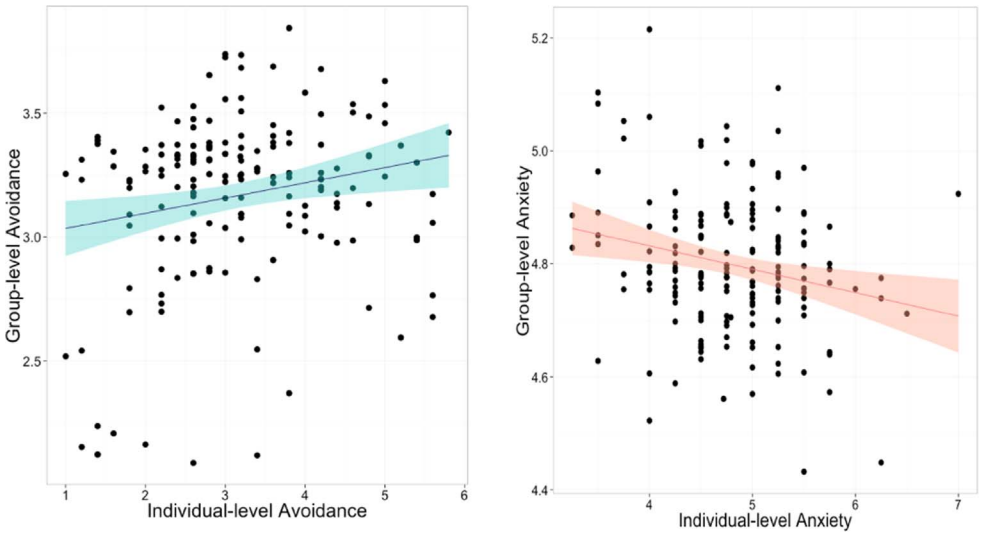

Fig. 2. When participants formed groups, they stood with others who shared their level of attachment avoidance, $r(169) = 0.23$, p = 0.003, but did not share their level of attachment anxiety, $r(169) = -14$, p = 0.08, on average.

5.1. Baseline interpersonal distance

As predicted, participants' attachment avoidance was positively correlated with their distancing during the study's mingling period, $r(169) = .16$, p = 0.04. Attachment anxiety was not significantly correlated with distancing, $r(169) = 0.13$, p = 0.10.

5.2. Group formation

Participants formed a total of 227 groups, with an average size of 6.8 members (SD = 3.0). Group size did not differ across the 9 trials of the study.

To examine group composition, we used a custom R script to aggregate scores of attachment anxiety and attachment avoidance for each of the 9 groups that participants formed (excluding the participants' own scores). Attachment homophily was operationalized as a correspondence between participants' and their group's attachment styles. To the extent that individuals affiliated on the basis of attachment anxiety, for example, their own attachment anxiety should be positively associated with the average attachment anxiety of the other members of the groups they join. Thus, we entered participants' avoidant and anxious attachment scores into 2 repeated measures multilevel models predicting group-level anxiety and avoidance respectively, with 9 groups nested within 172 participants. Group-level anxiety and avoidance were modeled as level 1 variables since they varied across trials, while individual-level attachment avoidance and anxiety were modeled as level 2 variables. During group formation, participants were more likely to stand next to those who shared their gender and attractiveness than would be expected by chance (see Halberstadt et al., 2016; osf.io/cbmjg/). Therefore, attractiveness and gender were also entered as level 2 covariates. Intercepts were modeled as varying across participants to account for the nested data structure.[2] Parameters were estimated using a restricted maximum likelihood algorithm. The intraclass correlation coefficients for the group-level anxiety (.18) and group-level avoidance (.34) models were each robust (Wald Z p < .001), indicating that participant-level variance accounted for a 18% and 34% of variance in people's grouping anxiety and avoidance, respectively.

Individual-level avoidance positively predicted group-level avoidance, 95% CIs [0.02, 0.13], while individual-level anxiety *negatively* predicted group-level anxiety, 95% CIs [− 0.09, − 0.02]. Incidentally, individual-level avoidance also positively predicted group-level anxiety, 95% CIs [0.03, 0.11]. Gender, attractiveness, and trial neither predicted group-level attachment anxiety nor group-level attachment avoidance. Table 1 gives the full set of model coefficients. Fig. 2 depicts effects on grouping avoidance and grouping anxiety.

In a second pair of multilevel models, we examined dynamic group composition effects by adding trial number as a level 1 predictor and modeling the cross-level interaction of trial number with participant anxiety and avoidance, respectively. That is, in one model we entered anxiety, avoidance, trial number, and their interaction terms as predictors of group anxiety, while in a second model we entered the same

[2] Modeling slopes and intercepts as random fit the data similarly well to modeling only intercepts as random (Chi squared p = 0.78). For parsimony, we chose to only model intercepts as random.

terms as predictors of group avoidance.

In these models, the aforementioned effect of participant avoidance on group avoidance was qualified by a significant avoidance x time interaction on group avoidance, $b = -.01$, $SE = 0.004$, $\beta = -0.07$, $t(1350) = -3.44$, $p < .001$, 95% CIs $[-0.11, -0.03]$, $f^2 = 0.005$, such that the effects of attachment avoidance on group avoidance (avoidant homophily) were stronger in earlier (−1 SD) groups, $b = 0.11$, $SE = 0.02$, $\beta = 0.22$, $t(209) = 3.55$, $p < 0.001$, 95% CIs [0.05, 0.16], compared to later (+1 SD) groups, $b = 0.03$ $SE = 0.02$, $\beta = 0.08$, $t(209) = 1.22$, $p = 0.22$, 95% CIs $[-0.02, 0.09]$. Time did not significantly interact with attachment avoidance, $b = -0.004$, $SE = 0.004$, $\beta = -0.02$, $t(1350) = -0.95$, $p = .34$, 95% CIs $[-0.01, 0.004]$, $f^2 < 0.001$, or anxiety, $b = 0.005$, $SE = 0.004$, $\beta = 0.03$, $t(1350) = 1.31$, $p = 0.19$, 95% CIs $[-0.002, 0.01]$, $f^2 = 0.001$, on levels of group anxiety. As in the previous models, attractiveness, gender, and trial predicted neither group-level attachment avoidance, $\beta s < |0.008|$, $SEs > 0.02$, $ts < |0.16|$, $ps > 0.88$, $f^2 s < 0.001$, nor group-level attachment anxiety, $\beta s < |0.05|$, $SEs > 0.02$, $ts < |1.14|$, $ps > 0.25$, $f^2 s < 0.003$.[3]

5.3. Mediation of avoidance homophily

Participants' attachment avoidance (though not their attachment anxiety) was related to both their baseline interpersonal distance (their distance from other participants as they waited for the study to start), and also to the level of attachment avoidance of other members of the groups that they later joined. Furthermore, baseline distance was correlated with group-level avoidance, $r(169) = 0.42$, $p < .001$, and a multiple regression including both baseline distance and individual avoidance as predictors of group-level avoidance showed that baseline distance significantly predicted the average avoidant attachment style of participants' groups, $b = .06$, $SE = 0.01$, $t(169) = 5.64$, $\beta = 0.40$, $p < .001$, CIs [0.04, 0.07], $f^2 = .19$, controlling for individual-level avoidance. These results suggest that avoidants' distancing behavior might statistically explain their tendency to group with similarly avoidant individuals. In conceptual terms, individuals with high levels of attachment avoidance appear to have sought interpersonal distance from other participants as they waited for the study to start, and their motivation to distance themselves drove their decision to form groups with individuals who were also high in attachment avoidance.

We formally tested this account using Preacher & Hayes's (2004) PROCESS model 4. We ran a bias-corrected bootstrap analysis based on 5000 samples with participant avoidance as the independent variable, interpersonal proximity as the mediator, and group avoidance as the dependent variable. This analysis revealed significant mediation, $\beta = 0.06$, CIs [0.007, 0.13], indicating an indirect effect of participants' attachment avoidance on their groups' level of avoidance through interpersonal proximity. The direct effect of individual-level attachment avoidance on group-level attachment avoidance remained significant, $\beta = 0.16$, CIs [0.02, 0.30], indicating partial mediation.

6. Discussion

When we form social groups, do we search for people we like, or do we search for people like us? We tested these two alternatives in the context of attachment styles, using a novel behavioral tracking paradigm to unobtrusively quantify participants' affiliative tendencies. Group members were more similar in their levels of attachment avoidance than would be expected by chance, presumably because avoidants inferred that other avoidants would offer them the interpersonal distance that they desired. In contrast, group members were *less* similar in their levels of anxious attachment than would be expected by chance, perhaps because anxiously attached individuals searched for security and warmth from their interpersonal partners, but did not display these qualities themselves (Collins & Feeney, 2000; Grabill & Kerns, 2000). Indeed, this lack of warmth may have been desirable for people with high attachment avoidance, who unexpectedly formed groups with more anxiously attached people than would be expected by chance. Whereas previous research has found that attachment insecurity is associated with subtle non-verbal cues (Fraley & Shaver, 1998; see Shaver et al., 2005 for a review), we show that these cues shape how people form groups on the basis of attachment style.

We interpret this pattern as a case of social inference-based affiliation, in which people only prefer similarity when it signals desirable traits. Because people tend to view themselves positively (Robins & Beer, 2001), the search for desirable traits in others will, as a rule, produce the homophily researchers have so often observed. However, when people seek traits that they themselves do not possess, the same process should lead to heterophily: the assembly of dissimilar others. In our investigation, avoidance-based homophily decreased over time, while anxiety-based heterophily remained stable over time. This suggests that familiarity might supersede social inference processes that lead people to seek out similar others (as in Halberstadt et al., 2016), but not those that result in people avoiding those like themselves. However, these time-based analyses should be interpreted with caution. Since participants were instructed to form groups with new people each time, the decrease in avoidance-based homophily may also have been due in part to task demand.

Although some studies suggest that attachment is relevant to the formation of dyadic relationships (e.g. McClure, Lydon, Baccus, & Baldwin, 2010), it is surprising that no previous research has studied the influence of attachment style in the formation of larger groups. Part of this gap is probably methodological. Researchers have only recently been able to precisely track large groups of strangers under conditions of high experimental control (Halberstadt et al., 2016). Our behavioral tracking paradigm yields this precision and control, and enjoys several advantages over paradigms based on hypothetical stimuli and attitudinal reports (Jackson et al., in press). These include but are not limited to increased face validity, external validity, and direct measures of social behavior. In most social environments, we choose to physically approach people with whom we want to affiliate, while avoiding less desirable alternatives, yet ours is one of the only paradigms that can effectively simulate and study these conditions. For example, while previous studies have shown a relationship between attachment avoidance and seat selection (Kaitz et al., 2004), ours is the first to document a relationship between attachment avoidance and interpersonal distance in large naturalistic groups.

One limitation of our approach was that we could not directly measure participants' inferences around their grouping partners. This is particularly relevant for our hypotheses regarding attachment anxiety—indeed, we could not directly measure whether anxiously attached people in our study really did appear neurotic or socially anxious during the study, meaning that other behavioral or demographic factors could have resulted in participants' grouping patterns. This said, the fact that avoidantly attached participants' baseline proximity mediated their grouping behavior suggests that attachment-related grouping patterns are driven by behavioral tendencies that are also linked to people's attachment style. In further support for this possibility, controlling for demographic characteristics such as race, gender, and attractiveness did not influence our findings. Nevertheless, future research should more precisely measure the mediating inferences that produce grouping patterns, while also testing whether group membership also can reciprocally shape these inferences.

These sorts of dynamic investigations—paired with future projects

[3] All significant results concerning participants' grouping behavior replicated at the $p < 0.05$ level after controlling for the other measured variables (self-esteem, collective self-esteem, death anxiety, and identity fusion) and demographic variables (minority status and age).

that validate our social inference approach experimentally and cross-culturally—should inform a more nuanced view into social group formation and homophily. While birds of a feather tend to flock together, their tendency to do so may depend on what those feathers signify.

Author contributions

JCJ formulated the research idea. JCJ and JH contributed to the design. JCJ and JH contributed to data collection. DB wrote the clustering and movement-analysis software. JCJ, EL, and JH analyzed and interpreted the data. JCJ, EL, and JH drafted the manuscript. All authors approved the final version of the manuscript for submission.

Ethics statement

This research was approved by the University of Otago Institutional Review Board. We have no conflicts of interest to report.

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References

Bahns, A. J., Crandall, C. S., Gillath, O., & Preacher, K. J. (2016). *Similarity in relationships as niche construction: Choice, stability, and influence within dyads in a free choice environment*.

Bahns, A. J., Pickett, K. M., & Crandall, C. S. (2011). Social ecology of similarity: Big schools, small schools and social relationships. *Group processes & intergroup relations* (1368430211410751).

Birnie, C., McClure, M. J., Lydon, J. E., & Holmberg, D. (2009). Attachment avoidance and commitment aversion: A script for relationship failure. *Personal Relationships*, *16*(1), 79–97.

Brumbaugh, C. C., & Fraley, R. C. (2010). Adult attachment and dating strategies: How do insecure people attract mates? *Personal Relationships*, *17*(4), 599–614.

Byrne, D. (1997). An overview (and underview) of research and theory within the attraction paradigm. *Journal of Social and Personal Relationships*, *14*(3), 417–431.

Collins, N. L., & Feeney, B. C. (2000). A safe haven: An attachment theory perspective on support seeking and caregiving in intimate relationships. *Journal of Personality and Social Psychology*, *78*(6), 1053.

Condon, J. W., & Crano, W. D. (1988). Inferred evaluation and the relation between attitude similarity and interpersonal attraction. *Journal of Personality and Social Psychology*, *54*(5), 789–797.

Conte, H. R., Weiner, M. B., & Plutchik, R. (1982). Measuring death anxiety: Conceptual, psychometric, and factor-analytic aspects. *Journal of Personality and Social Psychology*, *43*(4), 775.

Eastwick, P. W., & Finkel, E. J. (2008). Sex differences in mate preferences revisited: Do people know what they initially desire in a romantic partner? *Journal of Personality and Social Psychology*, *94*(2), 245.

Fabrigar, L. R., & Wegener, D. T. (2016). Conceptualizing and evaluating the replication of research results. *Journal of Experimental Social Psychology*, *66*, 68–80.

Fraley, R. C., & Shaver, P. R. (1998). Airport separations: A naturalistic study of adult attachment dynamics in separating couples. *Journal of Personality and Social Psychology*, *75*(5), 1198.

Gómez, A., Brooks, M. L., Buhrmester, M. D., Vázquez, A., Jetten, J., & Swann, W. B., Jr. (2011). On the nature of identity fusion: Insights into the construct and a new measure. *Journal of Personality and Social Psychology*, *100*(5), 918.

Grabill, C. M., & Kerns, K. A. (2000). Attachment style and intimacy in friendship. *Personal Relationships*, *7*(4), 363–378.

Halberstadt, J., Jackson, J. C., Bilkey, D., Jong, J., Whitehouse, H., McNaughton, C., & Zollmann, S. (2016). Incipient social groups: An analysis via in-vivo behavioral tracking. *PloS One*, *11*(3), e0149880.

Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, *52*(3), 511.

Hazan, C., & Shaver, P. R. (1994). Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*, *5*(1), 1–22.

Jackson, J., Bilkey, D., Jong, J., Rossignac-Milon, M. H., & Halberstadt, J. (2017). Strangers in a stadium: Studying group dynamics with in-vivo behavioral tracking. *Social Psychological and Personality Science* (in press).

Jackson, J., Halberstadt, J., Jong, J., & Felman, H. (2015). Perceived openness to experience accounts for religious homogamy. *Social Psychological and Personality Science*, *6*(6), 630–638.

Kaitz, M., Bar-Haim, Y., Lehrer, M., & Grossman, E. (2004). Adult attachment style and interpersonal distance. *Attachment & Human Development*, *6*(3), 285–304.

Kalick, S. M., & Hamilton, T. E. (1986). The matching hypothesis reexamined. *Journal of Personality and Social Psychology*, *51*(4), 673.

Klohnen, E. C., & Luo, S. (2003). Interpersonal attraction and personality: What is attractive—Self similarity, ideal similarity, complementarity or attachment security? *Journal of Personality and Social Psychology*, *85*(4), 709.

Luhtanen, R., & Crocker, J. (1992). A collective self-esteem scale: Self-evaluation of one's social identity. *Personality and Social Psychology Bulletin*, *18*(3), 302–318.

Mayseless, O., & Scharf, M. (2007). Adolescents' attachment representations and their capacity for intimacy in close relationships. *Journal of Research on Adolescence*, *17*(1), 23–50.

McClure, M. J., & Lydon, J. E. (2014). Anxiety doesn't become you: How attachment anxiety compromises relational opportunities. *Journal of Personality and Social Psychology*, *106*(1), 89–111.

McClure, M. J., Lydon, J. E., Baccus, J. R., & Baldwin, M. W. (2010). A signal detection analysis of chronic attachment anxiety at speed dating: Being unpopular is only the first part of the problem. *Personality and Social Psychology Bulletin*.

Mikulincer, M., & Selinger, M. (2001). The interplay between attachment and affiliation systems in adolescents' same-sex friendships: The role of attachment style. *Journal of Social and Personal Relationships*, *18*(1), 81–106.

Palmer, D. L., & Kalin, R. (1985). Dogmatic responses to belief dissimilarity in the "bogus stranger" paradigm. *Journal of Personality and Social Psychology*, *48*(1), 171.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, *36*(4), 717–731.

Robins, R. W., & Beer, J. S. (2001). Positive illusions about the self: Short-term benefits and long-term costs. *Journal of Personality and Social Psychology*, *80*(2), 340.

Rosenberg, M. (1965). *Society and the adolescent self-image. Vol. 11*, Princeton, NJ: Princeton University Press, 326.

Shaver, P. R., Schachner, D. A., & Mikulincer, M. (2005). Attachment style, excessive reassurance seeking, relationship processes, and depression. *Personality and Social Psychology Bulletin*, *31*(3), 343–359.

Simpson, J. A. (1990). Influence of attachment styles on romantic relationships. *Journal of Personality and Social Psychology*, *59*(5), 971.

Simpson, J. A., Rholes, W. S., & Nelligan, J. S. (1992). Support seeking and support giving within couples in an anxiety-provoking situation: The role of attachment styles. *Journal of Personality and Social Psychology*, *62*(3), 434–446.

Simpson, J. A., Rholes, W. S., & Phillips, D. (1996). Conflict in close relationships: an attachment perspective. *Journal of Personality and Social Psychology*, *71*(5), 899–914.

Singh, R., Simons, J. J., Young, D. P. C., Sim, B. S., Chai, X. T., Singh, S., & Chiou, S. Y. (2009). Trust and respect as mediators of the other-and self-profitable trait effects on interpersonal attraction. *European Journal of Social Psychology*, *39*(6), 1021–1038.

Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology*, *1*(2), 149–178.