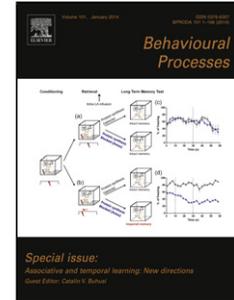


## Accepted Manuscript

Title: 'Sociability' affects the intensity of mate-choice copying in female guppies, *Poecilia reticulata*

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## Highlights:

- Female guppies copied mate choices of other females.
- Mate copying was highly variable among females
- A significant predictor of mate copying was their 'sociability' personality trait.

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8 'Sociability' affects the intensity of mate-choice copying in female guppies, *Poecilia*9 *reticulata*

10

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19

## Abstract

20 Selecting a quality mate can involve acquiring and accessing large amounts of  
21 information; information that can be obtained either independently or socially. One  
22 means of learning about mates socially is to attend to other members of one's sex and  
23 copy their mate choices. It is possible however that not all individuals of a species  
24 benefit equally from, or are equally effective at, copying. We examined whether female  
25 guppies copied the mate choices of other females. Then, in a separate context we  
26 measured each female's 'sociability': their proclivity to affiliate with other guppies. In the  
27 mate-choice copying procedure, 'focal' females chose to spend time near two putative  
28 mates. Next, focals observed another (model) female interact with the focal's non-  
29 preferred male. Finally, the focal again chose between the same two males. For  
30 sociability, we examined the time focal females spent near a trio of other guppies.  
31 Females did indeed mate copy: they spent more time with their non-preferred male  
32 when a model female had been seen interacting with that male. The effect however was  
33 highly variable. Sociability significantly predicted the intensity of mate-choice copying.  
34 Results suggest that individuals vary consistently in the types of information they use  
35 when making mating decisions.

36 Keywords: guppies; individual differences; mate-choice copying; sociability

37

38

## Introduction

39 The decision making processes involved in choosing a quality mate can be complex,  
40 requiring the integration of many types of information. Female mate choice has been  
41 studied across a wide variety of taxa and the number of male characteristics females  
42 use to select among putative mates is large; it includes males' secondary sexual  
43 characteristics (which often have to be integrated across modalities), their courtship  
44 behaviours, their courtship vigour, the resources they can provide, and the quality of  
45 their territory (Andersson, 1994; Bateson, 1983; Byers et al., 2010; Clutton-Brock and  
46 McAuliffe, 2009; Hebets and Papaj, 2005; Jennions and Petrie, 1997). In addition,  
47 females' search strategies, reproductive state, and developmental experiences all  
48 contribute to mate choice decisions (Badyaev and Qvarnstrom, 2002; Bateson, 1978;  
49 Lynch et al., 2005; Real, 1990; Riebel, 2000; ten Cate and Voss, 1999; Webster and  
50 Laland, 2011). Another valuable source of information about mates can come from the  
51 social environment. Attending to how a male behaves within a social context can reveal  
52 aspects of his dominance or social skills (Mennill et al., 2002; White et al., 2010; Zuk  
53 and Johnsen, 2000). In addition, the behaviour of other females can provide public  
54 information about the quality of their mates (Nordell and Valone, 1998). Taken together,  
55 learning about the quality of a potential mate can be cognitively demanding and involve  
56 combining information acquired from private and public sources (Witte and Noltemeier,  
57 2002).

58

59 One way females can use public information in mate selection is by copying the  
60 mate choice of other females (Losey et al., 1986). Copying females can learn about the

61 quality of potential mates while avoiding the costs of engaging in independent search  
62 and assessment and end up mating with a male of no worse quality than the choosing  
63 female. This type of non-independent mate choice has the potential to skew  
64 reproductive success among males and impact the direction and intensity of sexual  
65 selection (Agrawal, 2001; Brooks, 1996; Kirkpatrick and Dugatkin, 1994; White, 2004;  
66 Witte et al., 2015). Mate-choice copying was initially proposed to explain the  
67 pronounced skew in male reproductive success of lekking birds (Gibson et al., 1991;  
68 Höglund et al., 1990), but has most often been examined under controlled laboratory  
69 investigations. Mate copying, or similar social processes have been demonstrated in  
70 fish, birds, insects, mammals and even humans (Alonzo, 2008; Bowers et al., 2011;  
71 Clutton-Brock and McComb, 1993; Drullion and Dubois, 2008; Dubois, 2007; Dugatkin,  
72 1992; Fiske et al., 1996; Freed-Brown and White, 2009; Galef et al., 2008; Galef and  
73 White, 1998, 2000; Germaine et al., 2016; Goldschmidt et al., 1993; Grant and Green,  
74 1996; Hebets, 2003; Heubel et al., 2008; Höglund et al., 1995; Jamieson, 1995; Mery et  
75 al., 2009; Munger et al., 2004; Schlupp et al., 1994; Swaddle et al., 2005; White, 2004;  
76 White and Galef, 1999, 1999; Widemo, 2005).

77

78 One of the earliest and most extensive investigations of mate-choice copying was  
79 done by Dugatkin and Godin on guppies (Dugatkin, 1992, 1996a, 1996b, 1998;  
80 Dugatkin and Godin, 1992; Dugatkin and Godin, 1992; Godin and Hair, 2009). Guppies  
81 lend themselves very well to examinations of mate choice. They mate and breed readily  
82 in captivity and the number of characteristics of mates to which females attend is  
83 extensive, including multimodal signals, size, colouration, and courtship intensity

84 (Houde, 1997). In addition, they live in mixed-sex shoals, so the opportunity to use  
85 social information when making mate selections exists. To examine mate-choice  
86 copying, Dugatkin provided female guppies the opportunity to spend time swimming  
87 near two males, one of which had previously been observed to be interacting with  
88 another female. He found that the observation of the male with another female made  
89 that male more attractive to the subject female (Dugatkin, 1992). Since this first finding  
90 in guppies, Dugatkin and Godin have proceeded to show that the mate copying effect is  
91 strong enough to overwhelm an independent preference (Dugatkin and Godin, 1992),  
92 that the increased preference is for the male, not the location where the model female  
93 had been seen (Dugatkin, 1992), that the preference generalizes to the traits of the male  
94 (Godin et al., 2005), and that not all females engage in mate copying equally: younger  
95 females are more likely to copy older ones (Dugatkin and Godin, 1993) and large  
96 females are better models than small ones (Vukomanovic and Rodd, 2007).

97

98 Other labs, however, have failed to find mate-choice copying in guppies. Lafleur  
99 et al. (1997), using commercially bred guppies, and following Dugatkin's (Dugatkin,  
100 1992) procedures closely, failed to find any social effect on female preferences. Brooks  
101 (1999), studying a feral population of guppies in Australia, also failed to find mate  
102 copying, instead finding that females avoided males seen mating with other females.  
103 Scarponi et al. (2015) also found females avoided males seen mating with other females  
104 (a similar effect as in male Japanese quail; White and Galef, 1999).

105

106           There are several possible explanations for the discrepant findings across labs.  
107   First, perhaps subtle differences in the experimental methods or differences in the strain  
108   of guppies might introduce variability into the findings. Another possibility is that not all  
109   females engage in mate copying. There may be a subset of females who are more likely  
110   to attend to and use social information (as seen in foraging and habitat selection;  
111   (Barnard and Sibly, 1981; David et al., 2011; Giraldeau et al., 1994; Hahn and  
112   Silverman, 2006). In many species, females show consistent and persistent individual  
113   differences in proclivity to seek out and be near others (Aplin et al. 2014; Dingemanse et  
114   al., 2010; Dosmann and Mateo, 2014; Keiser and Pruitt, 2014; Sih et al., 2004; Wolf et  
115   al. 2011). If females differ in this ‘sociability’ trait, it is possible that only some females  
116   would be influenced by social factors when making mate choice decisions (David and  
117   Cezilly, 2011; Tromf and Brown, 2014). Pronounced individual differences in attending  
118   to and using social information could influence assortative mating, and patterns of male  
119   reproductive success, and thus could influence the likelihood of researchers being able  
120   to detect mate-choice copying - especially based on the methodology most commonly  
121   used to study mate copying.

122

123           In most of the above-mentioned examinations of mate copying, the standards for  
124   detecting a social influence on mate choice were high: preference is measured as a  
125   binary variable, either the female prefers the male or she does not. This is done for good  
126   reason: if swimming near a male is a proxy for the likelihood of mating (Bischoff et al.,  
127   1985), then one male should succeed in securing the female as a mate and the other  
128   should fail. Nevertheless, this procedure is not sensitive to small or moderate effects on

129 the choosing female's behaviour. White and Galef (Galef and White, 1998; White, 2004;  
130 White and Galef, 1999) created a procedure, derived from Dugatkin and Godin (1992),  
131 to investigate mate-choice copying in quail that was able to detect more subtle changes  
132 to females' mate choice decisions. Under this procedure, females were given a pre-test  
133 where they could evaluate the two males independent of any other female's presence.  
134 After this, a model female was added to the compartment of the male that the focal  
135 female had judged to be relatively less attractive (her 'non-preferred' male). After the  
136 observation phase, focal females again chose between the same two males and the  
137 change in the amount of time they spent near the initially non-preferred male from pre-  
138 test to post-test indicated the degree to which they were influenced by the presence of  
139 the model female. This was compared to the same female's consistency of preference  
140 when no model female was presented. In this procedure, the pre-test provides a  
141 measure of the focal female's independent assessment of the males and thus each  
142 female serves as her own control to compare how she weights public and private  
143 information when making a mate choice decision. In addition, the procedure provides a  
144 measure of the consistency of females' behaviour when not given access to social  
145 information. Here, even very small social influences on mate decisions can be detected.  
146 If females use information attained through copying for long-term changes to their mate  
147 selection decisions (Godin et al., 2005; Kneil et al., 2015; White and Galef, 2000), even  
148 a small effect on their probability of selecting a potential mate can be important.

149

150 In the current experiment we examined mate-choice copying in female guppies  
151 using White and Galef's (1999) methodology described above in order to get a more

152 sensitive measure of how females use public and private information when selecting a  
153 mate. Additionally, in a series of tests in a separate context, we examined each females'  
154 sociability: her tendency to approach and affiliate with conspecifics. We hypothesized  
155 that females' sociability would be predictive of the weight they would place on public  
156 information in the mate copying test.

157

## 158 Materials and methods

159 Twelve female guppies served as subjects in the experiments. In addition, we used  
160 twenty four male guppies in the mate choice experiments. We purchased fish from a  
161 commercial supplier (Big Al's Aquarium Supply, Kitchener, Ontario, Canada). All fish  
162 were non-gravid, sexually mature adults. Body size was very similar within sexes (all  
163 females were within 2 millimetres of each other, all males within 5 millimetres). We  
164 photographed fish to assist in identifying individuals and in measuring body size. We  
165 maintained all fish across six 10L holding tanks in same-sex groups (randomly  
166 assigned, except for similar-looking females, which we separated to help track individual  
167 identity) in a computer-controlled housing rack (Pentair Aquatic Habitats, FL, USA).  
168 Water temperature in the housing tanks was maintained at 22-24 °C, salinity at 500-700  
169 ppm, and the pH at 6.8-7.4.

170

171 Apparatus: We conducted all tests in a 40 x 20 x 25 cm glass aquarium. Two additional  
172 smaller 20 x 5 x 20 cm holding tanks, located at either end of the main aquarium were  
173 used to hold males for the mate-choice copying test. We used a standardized procedure

174 to measure mate preferences (Bischoff, et al., 1985; Dugatkin, 1992). We used a marker  
175 to divide the main aquarium into three sections for scoring purposes, two 10 cm  
176 preference zones at the two ends nearest the males and a 20 cm central neutral zone. A  
177 removable, clear 12 cm diameter Plexiglas cylinder was used to restrict fish movements  
178 in both the mate copying and sociability tests.

179

180 Procedure:

181 *Mate-choice copying trials.* The procedure was based on the methodology of mate  
182 copying experiments done on Japanese quail (White and Galef, 1999) and guppies  
183 (Dugatkin and Godin, 1992). These trials consisted of a pre-test where a randomly  
184 selected focal female spent 10 minutes swimming in the mate choice aquarium. We  
185 measured the amount of time she spent in the two end areas of the aquarium near two  
186 randomly selected, size matched males. After the end of the pre-test, we placed the  
187 cylinder over the focal female which held her in the centre of the aquarium. At this point  
188 we placed a randomly selected, size matched female (the 'model' female) in the  
189 chamber of the male with whom the focal female had spent the minority of her time (her  
190 'non-preferred' male). After another 10 minutes, the observation phase ended with the  
191 model female being removed. In the final post-test, we removed the cylinder and the  
192 focal female once again had 10 minutes to swim around the aquarium. Again we  
193 measured the amount of time she spent in the preference zones adjacent to the two  
194 males. We measured a mate-choice copying response for each female which we  
195 determined as the change from pre-test to post-test in the proportion of time she spent  
196 with her initially non-preferred male, excluding the time she spent in the neutral zone.

197 We also conducted control trials that were identical to the experimental trials except that  
198 during the observation phase we did not place a model female into either male's  
199 container. Thus these control trials measured the consistency in focal females'  
200 preferences for spending time with the two males from pretest to post-test in the  
201 absence of any social information. Experimental and control trials were  
202 counterbalanced. All females served as focal females in both types of trials. All females  
203 served as both models and focals with the order of running randomized. The two males  
204 used in a trial were never re-paired for any other trial. No female was grouped with the  
205 same males or female across trials. One female died before completing both  
206 experimental and control trials. We removed her data.

207

208 *Sociability tests:* We placed three female guppies in the Plexiglas cylinder in the centre  
209 of the aquarium and then placed a focal female into one of the ends of the aquarium.  
210 After two minutes of acclimation, we recorded the amount of time the focal female spent  
211 within 4 cm of the cylinder. After 10 minutes we returned all fish to their holding tanks.  
212 We tested each female three times across two weeks in this manner. All females served  
213 as focals and as part of the group in the cylinder with order randomized. No fish was  
214 tested as a focal multiple times on the same day.

215

216 *Other Individual Differences:* It is possible that the sociability test was actually  
217 measuring aspects of the females' behavioural tendencies that were not specifically  
218 social. For example, our sociability task might actually have measured the females'

219 tendency to explore their environment, their boldness, or merely their proclivity to be  
220 attracted to other moving objects. We therefore conducted two other tests on the  
221 females to control for these possibilities.

222

223 *Exploration, boldness:* Possibly, females who spent time near other guppies in the  
224 sociability test did so because they were more explorative or bold than the other females  
225 (or vice versa, spending time near other guppies for safety). To test these ideas, we  
226 conducted a test similar to the sociability test, but instead of using three female guppies  
227 in the cylinder, we placed a novel object into the centre of the tank. The novel object  
228 was a plastic coloured cylinder, 5 cm in diameter and 10 cm long. There were three  
229 different coloured cylinders: green, pink and blue. Each fish was tested three times with  
230 different coloured cylinders used for the different trials. We measured the amount of  
231 time the fish spent within 4 cm of the cylinder. If this test correlated strongly with our  
232 sociability score it would call into question whether that test was validly measuring  
233 sociability.

234

235 *Movement:* It is also possible that females who affiliated with the other guppies were not  
236 attending to the other guppies specifically, but were just attracted to movement. We  
237 therefore conducted a heterospecific association test that followed the same procedure  
238 as the sociability test but, instead of having three female guppies present in the cylinder,  
239 we used three zebrafish (*Danio rerio*). All other procedures were identical. Two females

240 died prior to completing these tasks, and one did not move around on any of the trials,  
241 thus we removed their data.

242

243 Data analysis: analyses were conducted using SPSS. Repeatability analyses using the  
244 intraclass correlation coefficient (ICC) were conducted using the *psych* package in R  
245 (v.3.2.2).

246

## Results

247

248 *Mate-choice copying.* Focal females spent a significantly higher proportion of time with  
249 their non-preferred male after observing him interact with a model female compared to  
250 when no model female was observed (paired t-test,  $T(10) = 3.07$ ,  $P = 0.012$ ; Cohen's  $d$   
251  $= 1.24$ ; Figure 1). The same pattern holds for comparisons using change from pretest to  
252 post-test in the number of seconds spent with the non-preferred male (mean increase in  
253 seconds spent with non-preferred male in experimental condition  $= 118.58 \pm 42.73$ ,  
254 mean for control condition  $= 6.00 \pm 12.8$  seconds; paired t-test,  $T(10) = 2.62$ ,  $P = 0.026$ ;  
255 Cohen's  $d = 1.18$ ). While the change in the amount of time focal females spent with their  
256 non-preferred male in the experimental trials was significant, it was also highly variable  
257 across females (in fact, the variance was 14.8 times greater than in the control  
258 condition). Eight out of 12 females increased the time they spent with their initially non-  
259 preferred male. In six of these cases focal females ended up spending more time with  
260 the non-preferred male than the preferred male in the post-test. Two females increased

261 the time they spent with the non-preferred male, but only marginally, and three females  
262 spent less time with the non-preferred male in the post-test.

263

#### 264 Sociability tests

265 We collected sociability measures from each of the 11 females. Across the three test  
266 trials females were consistent in their sociability scores ( $ICC(3,1) = 0.34$ ,  $F(10,20) =$   
267  $4.49$ ,  $P = 0.002$ ). Sociability was highly correlated with the change from pre-test to post-  
268 test in the proportion of time spent with the non-preferred male in the mate copying  
269 experimental trials (Figure 2a; sociability scores were averaged across the three trials;  
270 Pearson  $r = 0.72$ ,  $P = 0.013$ . The sociability scores for each of the three trials also  
271 correlated significantly with the mate copying scores, all  $r_s > 0.60$ , all  $P_s < 0.05$ ).

272

273 There were no significant correlations among the measures of time spent with the  
274 fish (or cylinder) across the sociability, exploration, and heterospecific association tests  
275 (sociability and exploration,  $r = -0.13$ ,  $P = 0.76$ ; sociability and heterospecific  
276 association,  $r = 0.29$ ,  $P = 0.49$ ; exploration and heterospecific association,  $r = -0.19$ ,  $P =$   
277  $0.65$ ), suggesting that the three tasks measured unrelated aspects of the females'  
278 behaviour. Females did not show consistency within measures across the three trials for  
279 exploration, but did so for heterospecific association (exploration  $ICC(3,1) = -0.13$ ,  
280  $F(7,14) = 0.594$ ,  $P = 0.751$ ; heterospecific association  $ICC(3,1) = 0.42$ ,  $F(7,14) = 3.41$ ,  
281  $P = 0.024$ ).

282

283           Neither the exploration or heterospecific association results correlated  
284 significantly with individual differences in the mate-choice copying response (exploration  
285  $r = 0.09$ ,  $P = 0.83$ ; heterospecific association,  $r = 0.31$ ,  $P = 0.45$ ; Figure 2b,c).

286

287           Since not all females were tested for the exploration test and heterospecific  
288 association test, the power to detect a relationship with mate copying was lower for  
289 these two tests than for the sociability measure. We therefore re-examined only the  
290 sociability data from the females from whom we had collected exploration and  
291 heterospecific association data. The correlation between sociability and the mate-choice  
292 copying response remained significant for these 8 females ( $r = 0.76$ ,  $P = 0.02$ )

293           Overall, only the sociability of the females was predictive of their mate choice  
294 copying tendencies. Somewhat surprisingly, heterospecific sociability was not highly  
295 correlated with conspecific sociability, suggesting that female guppies react to other  
296 guppies differently than to zebra fishes. Also surprisingly, we, unlike other labs (see  
297 Réale, et al., 2007), did not find across-trial consistency in exploration.

298           Experiment 2: Controlling for shoaling tendencies.

299           It was possible that the patterns of behaviour found in experiment 1 could be  
300 explained by females' tendency to shoal. Thus in both the mate copying trials and the  
301 sociability trials, focal females might have just been moving to an area where they saw  
302 other guppies, and not changing their mate choice decisions. We tested this possibility,  
303 following Dugatkin (1992), by conducting a mate-choice copying test with one  
304 procedural modification: we reversed the location of the two males after the observation

305 phase. Thus for focal females to show mate copying they would have to swim to the  
306 area in which they had *not* seen a model female during the observation phase.

307 Subjects: We used 12 new females and 12 new males as subjects for this experiment.  
308 Fish were maintained in the same manner and tested in the same apparatus as fish in  
309 experiment 1.

310 Procedure: Fish were run through a mate-choice copying test similar to experiment 1.  
311 The one procedural difference came at the end of the observation phase. Prior to  
312 releasing the focal female for the post test, we reversed the positions of the two males.  
313 This allowed us to determine whether the change from pre to post test in the amount of  
314 time focal females spent near the two males was due to their preference to spend more  
315 time near the non-preferred male or near the location where she saw more fish.

316

317 Results.

318 When in the experimental condition, focal females spent more time near their initially  
319 non-preferred male after seeing him courting a model female. They did not increase  
320 their time spent in the location where the pair of fish had been seen during the  
321 observation phase (paired t-test,  $T(11) = 3.147$ ,  $P = 0.009$ ; Cohen's  $d = 1.02$ ; Figure 3).

322

323

Discussion

324

325 We demonstrated that female guppies are influenced by the presence of other females  
326 when making mate choice decisions, but the effect was highly individually variable. The  
327 best predictor of the strength of the response to the model female was the focal female's  
328 sociability.

329

330 Our results provided a potential solution for the question of why there are so  
331 many different mate-choice copying findings in the literature (Brooks, 1999; Dugatkin,  
332 1992; Lafleur et al. 1997; Scarponi et al., 2015). Because the mate copying response  
333 was so highly variable among females, methodologies based on binary measures of  
334 preference may be less likely to demonstrate the social effect on preferences. We found  
335 some females who showed pronounced mate copying responses, some who showed  
336 very subtle ones, and some who did not mate copy at all (and may even have avoided  
337 the male associated with the model female). It is critical to be able to measure both the  
338 females' independent evaluation of the males and their reaction to the social  
339 information, all within one trial. This provides a way to place social and independent  
340 information in conflict and allows us to measure the magnitude of the mate-choice  
341 copying response within each female.

342

343 The finding that individual differences in sociability relate to mate choice  
344 decisions is intuitively clear and has some empirical support: females most likely to  
345 aggregate with other females in turn are most likely to use information acquired from  
346 others to influence their mate choice decisions (Trompf and Brown, 2014; Wolf and

347 McNamara, 2013). It is unclear, however, what is driving this effect. Is it that sociable  
348 females are more likely to attend to other fish and thus have overall more social  
349 information to use, or do all females acquire the same overall amounts of all types of  
350 information but the sociable ones place more weight on the social information over their  
351 own individually-acquired information when making mate choice decisions? Additionally,  
352 it is unclear what function the variability in social information use serves. It is possible  
353 selection has favoured sociability in another context and it emerges under mate  
354 selection tasks as a 'behavioural syndrome' (Sih et al., 2004). Alternatively, it is possible  
355 that more sociable females are more likely to use the social information in order to  
356 overcome less effective independent-assessment abilities, thus maintaining social  
357 information use vs independent information use in a frequency-dependent manner (a  
358 relationship recently found in nest selection patterns in cowbirds; White, et al.  
359 submitted). Perhaps, if there is a link between male characteristics and environmental  
360 conditions such that certain males vary in quality based on different environments, thus  
361 variability in information use might track different environmental circumstances (Boyd  
362 and Richerson, 1985). Mate copying has traditionally been considered a mechanism to  
363 simplify a cognitively complex decision; to remove some of the demands of  
364 independently assessing a potential mate. However it is possible that adding a social  
365 aspect to mate choice adds even more cognitive complexity to the decision, adding  
366 more information that must be acquired, evaluated, weighed and used. This could  
367 potentially lead to two distinct mate choice strategies, one based on independent  
368 assessment and one on copying, similar to the producer-scrunner relationships  
369 proposed to explain variation in foraging tactics (Barnard and Sibly, 1981; Giraldeau et  
370 al., 1994). In the wild, poeciliid fishes vary dramatically in their behaviour within and

371 across populations (Dingemanse et al., 2009; Riesch et al. 2009). It is possible that  
372 variation in their physical and social ecology could be driving variation in the use of  
373 social information in mate choice decisions.

374

375 Our laboratory-based investigation of mate choice in commercially bred subjects  
376 is limited in generalizability to wild population. 'Guppies' can be a vague category used  
377 by commercial suppliers to include several different kinds of breeding stock. These  
378 differences in breeding stock can be highly variable and might have contributed to the  
379 variability we found in our subjects. Our within-subject tests on this variability do  
380 contribute to a growing literature revealing that individual differences are important  
381 (Schuett et al. 2010; Sih et al., 2004; Smith and Blumstein, 2008; Wolf and Weissing,  
382 2012) and need to be taken into account in theoretical models not only of sexual  
383 selection but of social evolution in general. If there are consistent differences among  
384 females in their tendency toward sociability, this might influence how they find food,  
385 move about in their environments, and select breeding grounds and mates. This could  
386 lead to the modification of selection pressures acting on population structure, secondary  
387 sexual characteristics, and social cognition.

388

389

390

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392 care and use of Laboratory animals and was done under Wilfrid Laurier Animal Care  
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398

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## Figure Captions

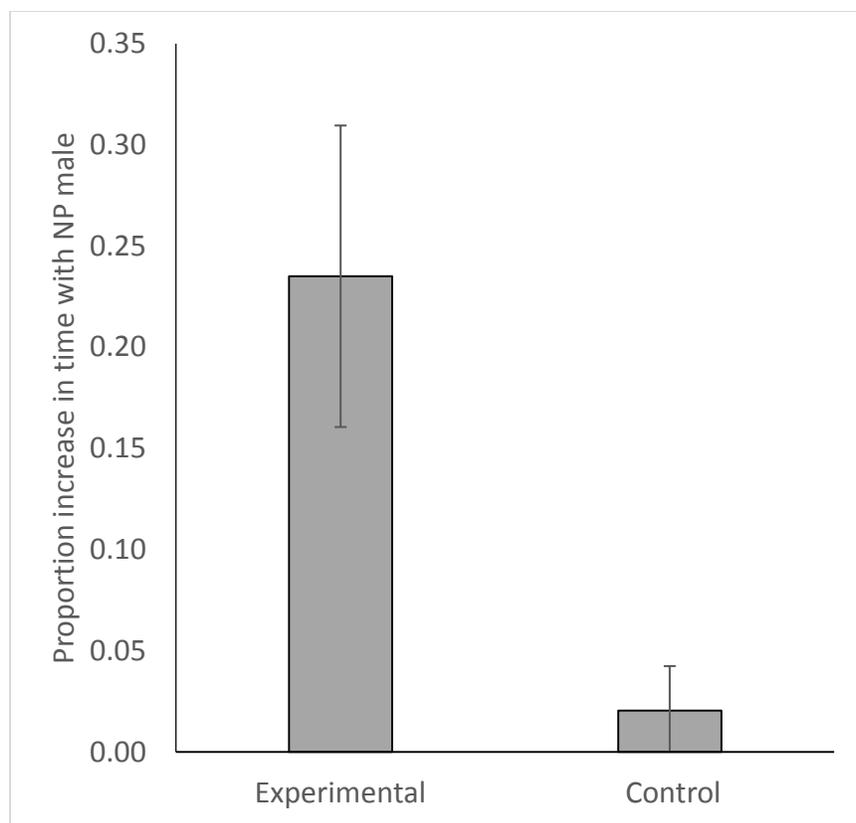
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401 Figure 1. Mean ( $\pm 1$  SEM) change from pre-test to post-test in the proportion of time  
402 focal females spent with their non-preferred (NP) male in the experimental and control  
403 mate-choice copying trials in experiment 1.

404 Figure 2. Scatterplot depicting the relationship between each focal female's mate  
405 copying response (i.e., the change from pre-test to post-test in the proportion of time she  
406 spent with her non-preferred male in the experimental condition of the mate copying  
407 test) and her (a) sociability score (total seconds spent near guppy trio, averaged across  
408 the three trials), (b) exploration score (total seconds spent near novel object, averaged  
409 across the three trials), and (c) heterospecific association score (total seconds spent  
410 near zebrafish trio, averaged across the three trials). Best fit linear regression lines are  
411 overlaid on each scatterplot.

412 Figure 3. Mean ( $\pm 1$  SEM) change from pre-test to post-test in the proportion of time  
413 focal females spent with their non-preferred (NP) male in the experimental and control  
414 mate-choice copying trials in experiment 2 (males' locations reversed).

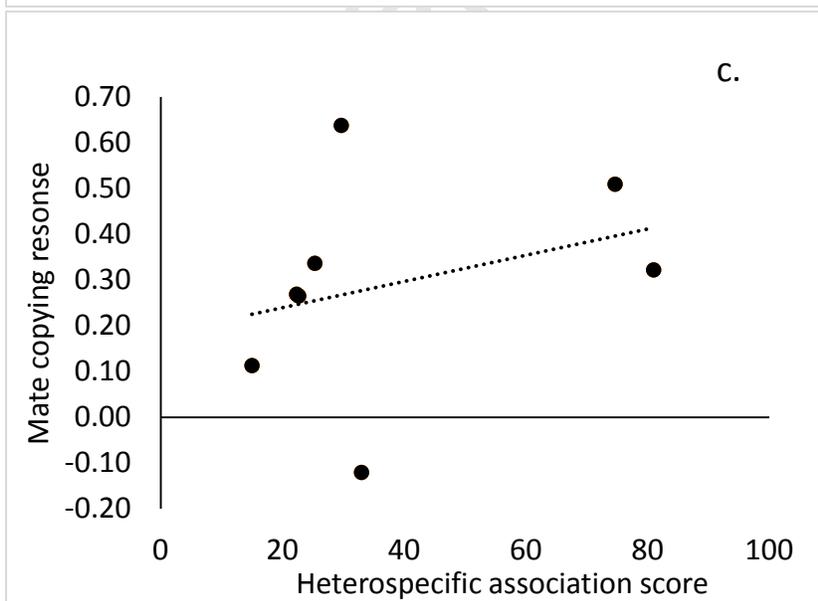
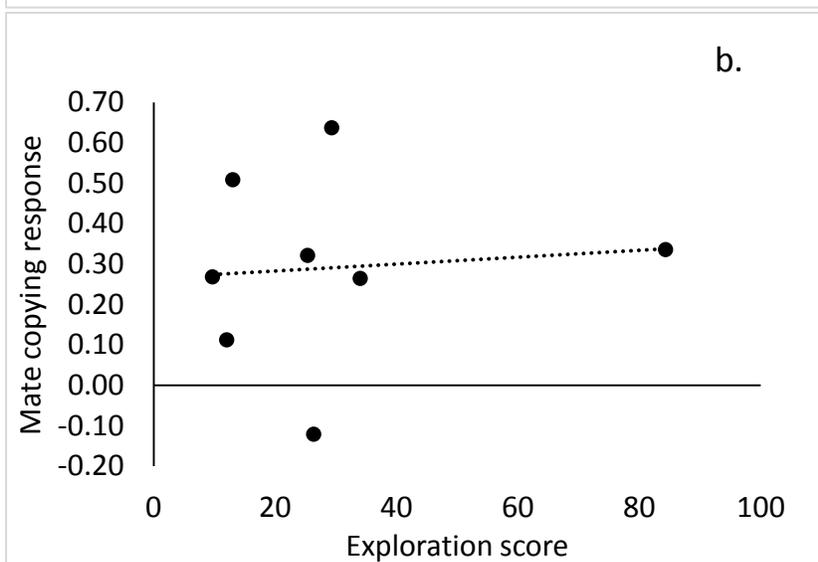
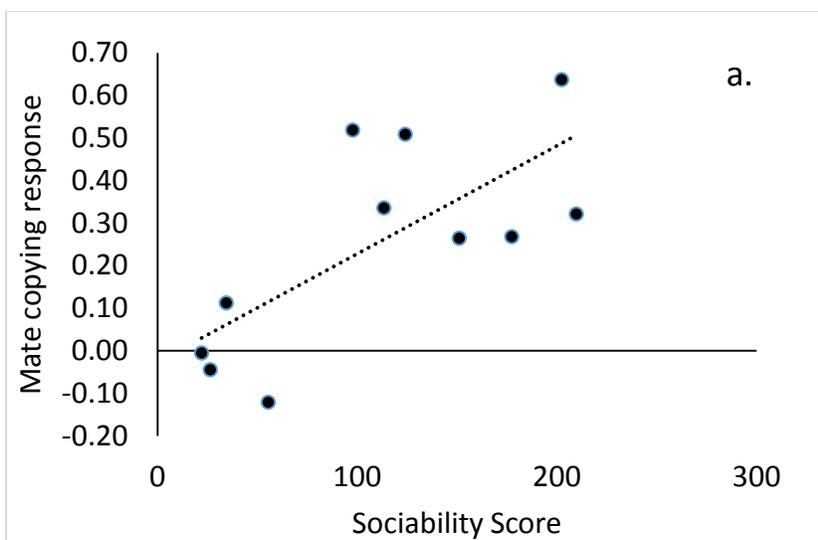
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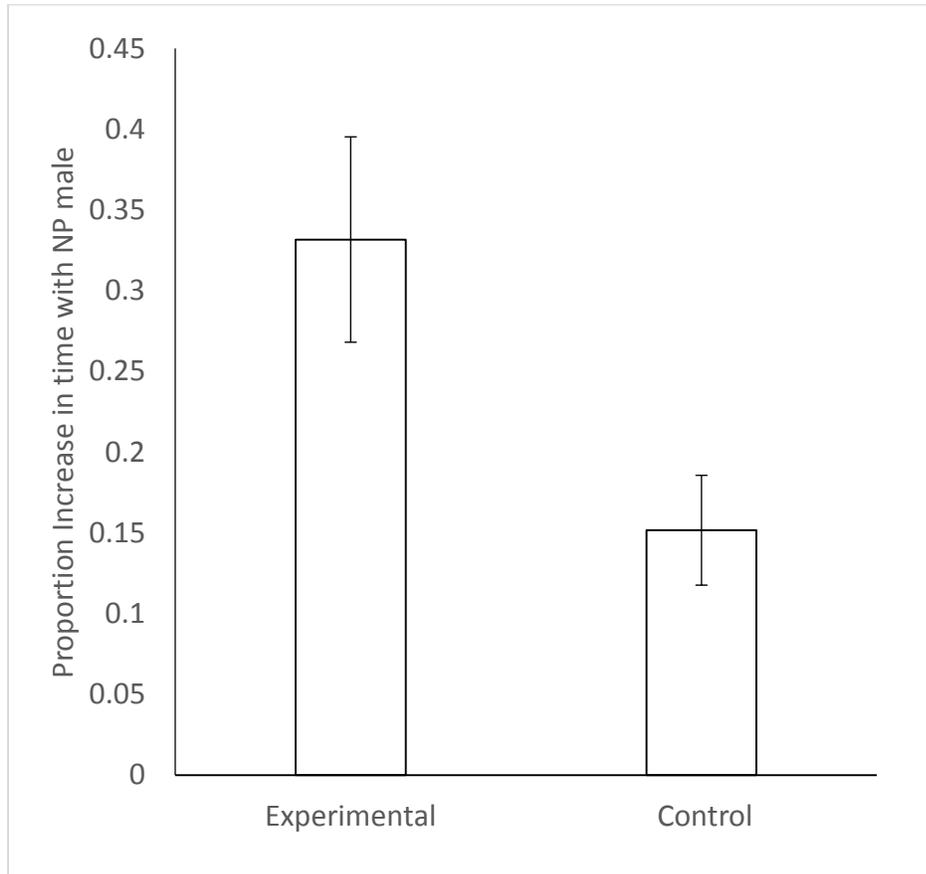
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