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Theoretical Review

WOMEN'S COMPETITION FOR MATES: EXPERIMENTAL FINDINGS LEADING TO ETHOLOGICAL STUDIES

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ABSTRACT

There has been an explosion of survey-based and experimental work pertaining to women's intrasexual competition for mates. Rather than extensively review this growing and vast body of literature, the goal of this paper is instead to call for ethological studies on this topic. I propose that, in general, non-ethological studies should cause us to question the reliability of findings, how frequently, and in what contexts competitive strategies are used. After a condensed overview of the evolutionary theory of female intrasexual competition, the paper is organized around three central problems that are faced by researchers who want to use an ethological approach. First, I will briefly review how female intrasexual competition involves multiple strategies that are often indirect or covert. Second, I will discuss how female intrasexual competition is dynamic, and changes depending on particular variables, such as hormonal status and audience. Third, I will argue that the context for examining competition matters, such that the reach of competitive views and attitudes is far wider than previously considered. I support this third point by presenting the results of a preliminary study where women appeared to engage in competition after merely being primed to think about potential threats to their romantic relationships.

Keywords: *female intrasexual competition, ethology, indirect aggression, strategies*

INTRODUCTION

Competition can be conceptualized in a variety of ways, however, for the purposes of this paper, I rely on Burbank's (1994) suggestion that competition represents a rivalry involving two or more individuals who are in pursuit of a resource that is perceived to be in limited supply. The individuals do not have to be aware of the rivalry, or of the identity of their competitors, but simply must be partaking in activity that draws them closer to attaining the desired resource that is limited in supply (e.g., Hrdy, 1999).

The resources that cause such competition to occur vary substantially. In general, "females compete for resources that are needed to survive and reproduce, and for preferred mates" (Stockley & Campbell, 2013, p. 1). Benenson (2013) expands this view; "Women compete to acquire resources for their kin, spouse, and affines and a few trusted female friends; to protect their own and threaten other women's alliances, especially marriages….to prevent other women from reducing their family's market value and opportunity for status enhancement in the larger community" (p. 2). For brevity, in this paper, I will primarily focus on women's competition for access to, and retention of, mates.

After a long period of neglect in favor of research into men's intrasexual competition for mates, the tide has turned and work on women's intrasexual competition for mates has gained considerable momentum over the past decade (see Fisher, 2013; Fisher, forthcoming; Stockley & Campbell, 2013 for a review). For example, there is new research in press on women's use of competition for the purpose of reproductive suppression (Salmon, forthcoming; see also Salmon, Crawford & Walters, 2008), and for status within (and across) groups (Liesen, forthcoming; Liesen, 2013). Some have studied specific behaviours in relation to competition, such as women's strategic beautification to successfully outperform rivals (e.g., DelPriore, Prokosch, & Hill, forthcoming; Durante, Li & Haselton, 2008; Röder, Brewer & Fink, 2009). The individuals involved in a competition has also been explored, such as that occuring between communal living sisters (Ji et al., 2013), and how mothers and daughters have competing interests in the latter's mate selection criteria (Kennair & Biegler, forthcoming). Others have recently examined how competition varies across the lifespan according to fluctuating hormonal profiles (Cobey & Hahn, forthcoming), the influence of ovulatory hormones and fecundity (Nikiforidis, Arsena, & Durante, forthcoming; Durante, Li & Haselton, 2008) and the influence of environment via operational sex ratios (Dillon, Adair, & Brase, forthcoming; de Jong, Forsgen, Sandvik, & Amundson, 2012). These examples display the variety of topics that researchers have begun to address in an effort to uncover and comprehend the often subtle and indirect nature of women's competitive behaviour.

Methodologies Used in Previous Research

The overwhelming majority of past psychological research on women's competition relies on survey methods, including self-reports of behaviour. This reliance on surveys should be revisited, for as the founder of human ethology Eibl-Eibesfeldt states, "The observation of

behavior in the natural context is an important starting point" (p. 4, 2009). Given that the tenet of ethological research is observation with an eye towards evolutionary function, survey approaches that rely on self-report are problematic for several reasons.

First, by asking individuals questions about the reasons for their behavior, or how they behave in a particular situation, researchers maybe incorrectly assuming that individuals possess an awareness and insight into the motivations of their own behavior. For example, Fisher and Cox (2011) asked women how they compete for access to mates, which yielded long lists of specific behaviors. However, there are no assurances that these lists were exhaustive, or that the participants were able to accurately identify all of their behaviors as being used for competitive purposes. Second, researchers assume that participants are being honest, and, based on my reading of the literature, researchers rarely perform validity checks to ensure accuracy; for example, when asking an individual about stress, one rarely also measures cortisol. One might argue that unless a participant perceives a question as risky (e.g., threatening reputation, status) or bringing negative consequences, there should be no motivation to deceive (e.g., Northup, 1996). In the case of competition, though, there may be strong social desirability biasing responses, as women are socialized to be like the nursery rhyme states: "sugar and spice and all things nice." Thus, those who admit to competing with other women may be perceived in a negative way. There is some evidence of this perception, ironically gathered using survey research, where men rated women who derogated potential rivals quite negatively (Fisher, et al., 2010). People also may unintentionally report erroneous data, due to bias, unreliable memory or recollection, for example.

Instead of surveys, one can use a qualitative approach and explore existing data using questions related to competition. For examine, Fisher and Candea (2012) investigated popular song lyrics sung by female musicians. They write, "Similar to the recent Darwinian analyses of art and literature, we sought to explore the various tactics and emotions underlying the female competitive experience by way of examining a selection of these songs" (p. 480). Although this approach removes problems related to self-report, there remain potential issues, such as researcher bias and interpretation, and an inability to quantitatively test hypotheses. However, one can argue that the data are ecologically valid in that they exist without intervention of, or manipulation by, the researcher, and are naturally produced by the participants.

There are also many excellent examples of ethnographic studies on women's crime and violence (Artz, 2005), especially among groups that have marginal access to economically based resources (for a review, see Campbell, 2013). These studies have been very informative for understanding women's competition, particularly as it relates to sex differences in aggression. However, there has been little *systematic* work that pertains to competition in relation to access for, or retention of, mates. This statement does not imply there are no relevant or interesting studies. Indeed, if one frames the issue in terms of indirect aggression against rivals (e.g., gossip, ostracism, ridiculing, manipulating reputations; see below), which is largely how women manifest their competitive strategies

and behaviors, several investigations have been performed on a wide variety of cultures (in Argentina, Hines & Fry, 1994; Australia, Owens, Shute, & Slee, 2000; among Tongan woman, Olson, 1994; in Greece, Kostash, 1987; on the small island of Vanatinai, New Guinea, Lepowsky, 1994; in Finland, Israel, Italy, and Poland, Österman, et al., 1998; in the United Kingdom, Campbell, 1995; among the Tsimane of Boliva, Rucas et al., 2006, and in Zambia, Schuster, 1983). In addition, Ji et al. (2013) have examined reproductive competition among female kin in the matrilineal Mosuo of China.

In addition to this body of work, there are a small number of experiments on women's intrasexual competition. Experiments where a variable is manipulated and competition elicited are a valuable improvement over self-report methods, as they are not plagued with the issues outlined above. However, to the best of my knowledge, there has been only a handful of past attempts to study women's intrasexual competition using non-survey methods. For example, Valliancourt and Sharma (2011) used an innovative design where researchers observed reactions to an attractive female confederate who was dressed (and not dressed) provocatively. Using a different paradigm, Lucas and Koff (2012) found women in the most fertile phase of their menstrual cycles were more competitive over resources in ultimatum games played against attractive women than with less attractive women. They propose, "withholding resources from potential rivals would enable women to gain the means to enhance their attractiveness and weaken competitors' abilities to do the same at a time when relative advantages in appearance are most crucial to reproductive success" (p. 16).

Another perspective to understanding behavior, that is the most ecologically valid, is to use ethology. Ethological methods of investigation allow one to understand human behavior in the contexts in which it naturally occurs. Ethology tends to rely on an inductive approach, in that one starts with observation and describing action within natural contexts, and then proceeds to question function, and eventually, examine species in a more phylogenetic (than single-species) manner. The power offered by ethology is impressive, in that it allows for a far deeper understanding of the proximate and ultimate causes of behavior. Moreover, situations involving competition need to be unstaged or manipulated, lest researchers influence the observed behaviour. Thus, ethologists need to revisit the tenets of human ethological observation, similar to the work of "Irenaeus Eibl-Eibesfeldt, co-founder of ISHE (International Society for Human Ethology) and author of many textbooks on ethology and human ethology. He and his team conducted fieldwork in several traditional cultures and thereby created the world's largest film/video documentation of unstaged social interactions in real life situations" (Figueredo & Richer, 2011). Using such an approach to study women's intrasexual competition for access to, and retention of, mates has been sadly neglected.

Therefore, I propose that researchers must begin to turn to ethological methods to advance in their studies of women's intrasexual competition for access to, and retention of, mates. To better inform this process, I identify three obstacles that will need to be addressed

by future researchers. However, I first start with a short recap of the evolutionary view of women's intrasexual competition to provide context.

What is an evolutionary view of women's intrasexual competition?

In general terms, women's intrasexual competition entails rivalry for any limited resource, such as resources that would enhance one's own reproductive value and success, or resources that might be allocated to one's children and kin (see Stockley & Campbell, 2013). Due to the potentially wide range of behaviours this definition includes, the focus here is on intrasexual competition for access to, or retention of, mates via the use of strategies. These strategies may rely on indirect aggression (e.g., ostracism, gossip), verbal aggression (e.g., shouting slurs) or direct aggression (e.g., physical contact).

Past research has indicated that girls' and women's aggression tends to be of the indirect type (see Fisher, 2013, or Vaillancourt, 2013 for a review). Indirect aggression refers to behaviours in which a perpetrator attempts to cause harm while simultaneously trying to make it appear as though there was no harmful intention (Björkqvist, Lagerspetz, & Kaukiainen, 1992). Indirect aggression is often linked to relational aggression (Crick & Grotpeter, 1995; Henington, Hughes, Cavell, & Thompson, 1998), which is the manipulation of peers via their relations and reputation, and interference with friendships and group inclusion. Often indirect aggression is used within the context of relationships, directed at someone's reputation, or for the purposes of group exclusion, for example. The distinction is that indirect aggression refers to the concept that there is an unknown aggressor or that the aggressor can claim that s/he was not performing an act for aggressive purposes. Instead, relational aggression can involve direct or indirect tactics, as the only criterion is that relationships be involved.

Women's indirect aggression may include behaviours such as breaking confidences, criticizing other's clothing, appearance or personality, trying to win others to one's side, excluding one from the group, writing nasty notes, and spreading false stories and gossip (Björkqvist, 1994; Owens, Shute, & Slee, 2000; Simmons, 2002). It often involves the use of social networks which obscures any intention to cause harm, thus reducing the likelihood of retaliation (Björkqvist, et al., 1992). Consequently, the victim is attacked circuitously so that the attacker can often inflict harm without being correctly identified (Björkqvist, 1994; Björkqvist, et al., 1992). Furthermore, females tend to perform their aggressive acts from within a tightly woven group of allies, thereby intensifying the damage to the victim (Simmons, 2002), as more aggressors are involved.

During intrasexual mating competition, the rival may be known or unknown to the individual. For example, when a woman attempts to make herself appear attractive for the purposes of gaining favorable attention from a man, she is not necessarily aware of how the other women in the immediate environment will be dressed, or who else the man might be dating. Thus, she attempts to make herself look maximally attractive while not knowing the identity of her rivals. This said, women do seem to monitor the attractiveness of potential competitors (e.g., Fisher, 2004). It should be noted that in my use of Darwin's (1871)

formulation of sexual selection theory, specifically regarding intrasexual competition and intersexual selection, there is a fine distinction that needs to be clarified. Intrasexual competition refers to same-sex competition, while intersexual selection refers advertising desirable traits that are preferred by the opposite sex in order to be selected as a mate. Thus, while it would be correct to think of self-promotion (e.g., enhancing one's own physical attractiveness) as meeting the criteria for intersexual selection in that it increases the strength of a trait desired by the opposite-sex, I argue that it is done for the implicit purpose of causing a rival to be at a disadvantage, thereby qualifying as intrasexual competition.

Four strategies that rely on indirect means have been identified as being used in intrasexual competition, by both men and women (see Table 1). I have omitted physical aggression and threats, as they are relatively directly aggressive, although I acknowledge women do use these strategies (Cashdan, 1996) albeit less often than men (Archer, 2009).

WHAT ARE THREE PROBLEMS FOR AN ETHOLOGICAL STUDY OF WOMEN'S INTRASEXUAL COMPETITION FOR MATES?

Problem #1: Multiple, indirect strategies are used

Hrdy (2013) reviews the historical (i.e., up to the 1975) lack of attention to female intrasexual competition and discusses how zoologists have proposed several reasons for the neglect. For example, she mentions "inherent difficulties in documenting selection pressures on females" demands "more sophisticated sampling methods and longer-term field studies….Compared with the conspicuous displays and bloody conflicts leading to skewed reproductive success among males, female-female competition will often be more indirect or subtle" (p. 2). Thus, the first issue that ethologists working to understand women's intrasexual competition will encounter revolves around the difficulties of documenting subtle and indirect behaviours.

As reviewed above, indirect aggression is the primary way in which women's competitive behavior is manifested. It includes, for example, criticizing a rival's appearance, spreading rumours about a rival, and social exclusion (see for a review, Vaillancourt, 2013). According to Vaillancourt (2013), "Indirect aggression is circuitous in nature and entails actions such as getting others to dislike a person, excluding peers from the group, giving someone the 'silent treatment', purposefully divulging secrets to others, and the use of derisive body and facial gestures to make another feel self-conscious. Interestingly, indirect aggression also includes behaviors that have been shown to be used by women around the world when attempting to reduce the mate value of a competitor—criticizing a competitor's appearance and spreading rumors about her sexual behavior. Although developmental psychologists have tended to not conceptualize females' use of indirect aggression as an intrasexual competition strategy…it is an effective approach that is used primarily and ubiquitously by girls and women when they are at the peak of their reproductive value" (p. 1). Thus, one

very challenging issue that is faced by ethologists is cataloguing indirect, covert behaviors, especially when they may be disguised as serving (or intentionally performed to serve) another function. For example, purposely divulging a secret to others may help with alliance formation or in maintaining friendships (for evidence in girls, see McDonald et al., 2007).

Table 1. Strategies for Intrasexual Competition

Strategy	Description	Example	Reference(s)
Self-promotion	The enhancement of one's positive qualities, relative to those possessed by members of the same sex	Dress attractively, wear cologne or perfume, act kind and interested in mate	Buss, 1988; Schmitt & Buss, 1996; Walters & Crawford, 1994
Competitor derogation	Any act used to decrease a rivals' mate value, relative to oneself	Telling a mate that a rival is sexually frigid or promiscuous, or highlighting negative personality or physical attributes	Buss & Dedden, 1990; Schmitt & Buss, 1996
Mate manipulation	Remove the target or goal of the competition (i.e., the mate) so no need to compete; the goal is to remove mate's attention from rival	Sequester the mate, make sure s/he does not notice rival	Fisher & Cox, 2011
Competitor manipulation	Manipulate the rival to decrease the effectiveness of her/his strategy use, or effectively change her/his perceived worth of the mate	Deceptively (i.e., incorrectly) inform rival that the mate is gay, or a "player" with an sexually transmitted infection	Fisher & Cox, 2011

However, this problem is exacerbated by the fact that different strategies may be used during competition. The majority of past research discusses only two of the four strategies identified in Table 1; self-promotion and competitor derogation. There are potentially two reasons for this limitation. First, past work generated items for surveys by asking participants

to nominate acts that they had performed to compete for mates (e.g., Buss, 1988). Strategies or behaviours that are highly subtle or indirect were not often included in the results, and hence, excluded from the overall conclusions of the researchers (see Walters & Crawford, 1994). Moreover, past researchers asked respondents to specifically reflect on self-promotion (Buss, 1988) or competitor derogation (Buss & Dedden, 1990), with no option for other types of strategy use.

To address these limitations, Fisher and Cox (2011) conducted two studies. Using a qualitative design, they first simply asked participants to list the ways that they compete with others of the same sex (e.g., for dating partners or attention). This approach yielded two additional strategies; mate manipulation and competitor manipulation (see Table 1). Based on this list, they then created a survey, with the items reflecting tactics both sexes reported in the qualitative study. The results indicated that people use self-promotion the most often, followed by mate manipulation, with equivalent use of competitor manipulation and competitor derogation. I note that this methodology is limited in that it presumes people are aware of how they compete, the functions of their behavior, and can accurately classify their actions as competitive.

Other researchers, such as Benenson (2013), have examined girls' building of alliances vs identifying adversaries, and arrived at a different set of strategies that may be used; I note that these also rely on indirect aggression as previously discussed. She identifies "strategies that minimize the risk of retaliation and reduce the strength of other girls. Girls' competitive strategies include avoiding direct interference with another girl's goals, disguising competition, competing overtly only from a position of high status in the community, enforcing equality within the female community and socially excluding other girls" (p. 1). She further argues that, "By late adolescence, a girl's success in finding a valuable spouse can influence her entire reproductive career. Forming alliances with kin, a few trusted female friends, then a spouse and affines, while reducing the power and number of female competitors, enhance the probability that a woman's children and grandchildren will prosper" (p. 8). Taken together, whether one uses the set of strategies identified by Benenson (2013), or by Fisher and Cox (2011), or others, it is clear that multiple strategies are used, and that these are often indirect, circuitous and easily disguised as serving other intentions.

Thus, multiple strategies is a problem for ethological research because a wide assortment of behaviours can be considered as relevant to women's intrasexual competition for mates. Moreover, as the above review suggests, the strategies involve behaviours that may be highly subtle, covert, or indirect, and thus are potentially difficult to observe and document. Consequently, before one is able to create a catalogue of behaviors for coding observation, it is challenging to have a clear sense of what actions are relevant, and the associated adaptive function of these actions. It is also very difficult to observe behavior and accurately infer individuals' intention to actually compete.

Moreover, mating competition, and the types of strategies used either independently or in conjunction with each other, may vary due to the mating systems. Compared to many

societies, women's competitive experience is likely distinct in stratified, non-polygynous societies (i.e., the desirability of wealthy males is not reduced by the diversion of resources to additional wives and their children), as evidenced by the occurrence of dowry (Gaulin & Boster, 1990). The tension between co-operation and conflict has also been documented conflict among co-wives, particularly as rivalry may stem more due to a husband's sexual rather than material attention, as the former is difficult to equally distribute (Jankowiak, Sudakov, & Wilreker, 2005). Thus, while there is existing work that attempts to show the range of potential behaviors, such as Benenson (2013) and Fisher and Cox (2011), it would be critical to use observations based on context prior to creating a taxonomy of behaviors for these cultures.

Problem #2: Women's intrasexual competition is dynamic, not static

There are various ways to consider a behavior as dynamic. It can be an action that varies temporally due to hormonal variation, or according to the presence of others in one's environment, for example. Thus, to show the ways in which competition is dynamic (e.g., flexible or changing), I first perform a cursory review of the influence of the ovulatory cycle on women's competitive behavior, and then dive into issues of audience.

One of the most well explored issues in the area of women's intrasexual competition is that concerning the effects due to ovulatory cycle phase. For example, when women are in the ovulating phase, and thus hence maximally fertile, they rate female faces significantly less attractive (Fisher, 2004). The argument is that because men place a premium on female attractiveness, women will compete using the vehicle of attractiveness. Furthermore, since the probability of conception varies across the ovulatory cycle, women's competitive behaviour targeted at access to, and retention of, mates is expected to similarly vary. Putting these ideas together, when the probability of conception is the highest, women may derogate the attractiveness of potential rivals, as evidenced by decreased ratings.

More recently, Piccoli, Foroni, and Carnaghi (2013) showed that near ovulation, women were more likely to 'dehumanize' other women, but not men, by describing them using animal-related words (e.g., snout). During the ovulatory phase, they were also more likely to agree with statements such as "I tend to look for negative characteristics in attractive women" than during other phases of lower fertility. Women also tend to wear more revealing and sexy clothing during the ovulatory phase, as evidenced by photographs taken in a laboratory (Durante, Li, & Haselton, 2008). This trend had been examined in actual spending behaviour, as well (Saad & Stenstrom, 2012, but see also Röder, Brewer, & Fink, B. 2009). Furthermore, Durante et al. (2011) found that when given photographs of clothing items from a shopping website, women in the ovulatory phase were more likely to choose sexier items when they were informed that there were many attractive women in the local environment, as compared to situations where they received no information about the environment. In this study, the information about the environment provided context pertaining to the likelihood of there being potential competitors, as well as the rivals' perceived mate value.

This body of work indicates that ovulatory hormones influence women's views of potential rivals, as well as how they alter their behaviour to enable them to be more competitive. Thus, women's views and behaviours are not static, and researchers must consider hormonal levels and other potential influences, such as age, life history, and fecundity. In addition, attractiveness is only one way in which women compete, albeit an important route. There may be other characteristics that are influenced by, or perceived differently due to, ovulatory hormones. Thus, for ethologists, it is critical that issues that directly impinge upon reproductive success (e.g., hormonal variation) are considered, and that more broadly, behaviour is seen as flexible (e.g., at least partially dependent on the current environment, see Durante et al., 2011).

As mentioned, competition behavior can also vary according to interpersonal dynamics. One such issue to contemplate is simply the ratio of females to males in a given group of interacting individuals. Miller and colleagues (2012) found that higher ratios of opposite sex (theoried to represent potential mates) to same-sex individuals (theoried to represent potential mating rivals) changed testosterone levels among both men and women competing in an ultimate Frisbee tournament. These findings suggest that ethologists also must be aware of the ratio of potential mating opportunities vs mating rivals within a context.

Within the realm of interpersonal dynamics, there is also considerable complexity when one begins to engage in theory of mind tasks and tries to understand the strategies that other rivals may employ. That is, what is the best strategy to employ to win against a rival, given what a potential mate may be thinking, or what the rival may be about to do? These sorts of decisions were explored by Cox and Fisher (2008) but remain largely untested to date. I mention this issue, though, because it is possible that one's strategy may need to be altered quickly, in light of interpersonal dynamics or the actions of others. This alteration may add another obstacle for ethological studies, as determining a behavior's function may involve recognizing the behaviors of other individuals.

Problem #3: Contextual influences on women's competition

It has been mentioned that women who derogate other women are perceived in negative ways. Using a pre-post design, Fisher et al. (2010) documented that when women derogated the appearance, personality, or sexuality of other women, men decreased their ratings of the derogator's kindness and overall desirability, among other attributes. Women's ratings similarly showed decreases in how they viewed the derogator's friendliness, kindness, attractiveness, potential parenting ability, and trustworthiness. Although this research provided insight into why women use other strategies more often than they derogate competitors, it did not address whether one perceives just the derogator negatively, or women in general, once primed to think about competition for mates. That is, it failed to get at the heart of the matter, which is how context influences women's competition. If women start to think about competition, does that pervade how they view other women who are not

involved in the mating competition; do they see these external women as behaving in negative, or even competitive ways?

To partially address this limitation, Archibald and Fisher (2014) created a study based on a pre-post design. In the first phase, female participants rated 20 photographs of naked women on a variety of characteristics (e.g., how attractive the model was, as well as her intelligence and friendliness). Then, they read an imaginary competitive situation where their partner showed potential romantic or sexual interest in another woman, or where another woman showed potential interest in their partner. Following the short vignette, participants again rated the same photographed women on the same dimensions, with the dependent variable being the change in ratings due to the participant reading the vignette. Therefore, participants were primed to think about intrasexual competition for mates, but were not told that the model in the photograph was at all related to the story.

An example of one of the primes is as follows. Note that we used a random design, with four primes such that one vignette was followed by photographs of five women.

> *"Imagine you and your partner are at a restaurant. You continuously notice his eyes following a waitress around the restaurant. As the meal goes on, you notice he is paying less attention to you, and more attention to her. You continue to sit there and not say anything about what you notice. After a while he makes a comment about how attractive he finds her and you think you hear him quietly say to himself he wishes he had met her before you, because he would love to be with her."*

Our preliminary findings revealed that women significantly decrease their evaluations of the photographed women with respect to the latter's attractiveness, friendliness and intelligence. They were significantly less likely to want to befriend her, or recommend her as a friend to an opposite sex friend. However, self-ratings of attractiveness (i.e., "how attractive do you feel when compared to this woman") and of desirability remained unchanged. Therefore, these findings suggest that women can be easily primed to view other women as competitors, and consequently view them more negatively (Archibald & Fisher, 2014). It remains to be determined if participants believed that the woman described in the prime was shown in one of the photographs, or not.

The reason that this issue is a potential problem for ethologists is because the results suggest women do not have to be directly informed about who is a potential rival to think of women in this manner. Instead, they simply need to imagine that there was a threat to their relationship, and then, separately, to evaluate uninvolved women on a variety of dimensions. Given the contagious nature of competitive thoughts, as indicated by these findings, ethologists hoping to study women's intrasexual competition must closely consider the context, consider who is in the immediate surroundings, and be aware of potential influences on observed action, even if they seem outside the reach of what one may consider 'competition.'

Although an understanding of these three problems is crucial for developing an ethological approach for the study of female intrasexual competition, these issues are not

necessarily restricted to this specific topic. That is, any other human behavior that is mostly indirect, dynamic and fluid, and contextually sensitive, faces the same methodological and theoretical considerations. Thus, the topic of female intrasexual competition serves as a good model for highlighting such methodological issues, and the importance of using an ethological approach in the study of human behavior in a more general perspective.

DISCUSSION

There is recent momentum to study the evolutionary basis of women's intrasexual competition for mates, as well as competition for limited resources that might influence reproduction and survival in other mammalian species (see the December 2013 issue of Philosophical Transactions of the Royal Society, Series B, which was dedicated to this topic; Rosvall, 2011).

However, as reviewed, women's intrasexual competition has rarely been studied using ethological methods, which leads to questions concerning the reliability of the findings, how frequently and in what contexts competitive strategies are used. I discussed some of the issues that researchers face when using survey methods, especially if they rely on self-reports of motivation and behavior. I then outlined the need for ethological research in this area, and identified three problems that need to be overcome. I fully acknowledge that there may be more issues that researchers will have to conquer and merely present these as examples of ways in which existing research can be used to predict some of the obstacles that one will face.

One possibility for future ethologists is to use observational, naturalistic paradigms similar to Monica Moore's (1985) classic study on flirting. She conducted a two part study, where by in first part, she watched 200 women in order to create catalogue of 52 behaviours involved in nonverbal solicitation. In the second part, she observed women in singles' bars, university snack bar, university library, and women's center. Her unobtrusive observations allowed her to conclude that in the most mating relevant context (i.e., the bar), females performed the most nonverbal displays at males. In addition, context independent, women who performed more signals were approached more by men. Thus, researchers could use a method very similar to Moore to examine women's interactions with other women in a variety of contexts. The prediction would be that in a situation where individuals often attempt gain access to mates (e.g., a single's bar), more competitive behaviours should be observed.

Alternatively, one may adopt an approach similar to Ahmad and Fisher (2010) who examined men's nonverbal cues in a bar in relation to their potential mating success (i.e., whether the man left with a woman to whom he had displayed). Researchers could examine women's nonverbal competitive behaviour and document whether those who display the most frequent behaviours more often leave with a male, thereby indicating success at acquiring a potential mate.

While these types of design do not address all three problems listed in this article, they do not face self-report validity problems, nor issues of manipulating the context vis-à-vis an experiment. It would allow multiple strategies to be catalogued (including indirect ones), and is potentially free of some of the issues dealing with dynamic vs static contexts. The problem of inferring intention on observed behavior remains, however. Thus, although not a perfect solution, I mention these two studies as approaches that may be useful to inspire future, ethological studies.

CONCLUSION

There have been recent studies into exploring women's intrasexual competition for mates, although these investigations primarily rely on surveys, qualitative data, experiments, or ethnographic reports. An ethological approach solves many of the problems with these methodologies. However, women's intrasexual competition for mates is often indirect and subtle, and comprised of numerous strategies. It is dynamic (e.g., hormonally and audience influenced), and 'contagious' in that competitive views may be easily primed and then uninvolved women are seen more negatively. If scholars are to complete ethological studies, they must create behavioral catalogues that are reflective of depth of behaviors and note the adaptive function(s), which are likely grounded in strategies. Some behaviours may have more than one adaptive function; for example gossip may be used for intrasexual competition (Fisher & Cox, 2011), yet it may also be used for social alliance formation and bonding (Dunbar, 1998). Moreover, researchers must attend to the audience and context, such as who is located nearby. While the topic of women's intrasexual competition for access to, and retention of, mates has grown considerably in the last years, ethologists are in a position to add, in a valuable manner, to this literature.

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