

Original Article

The effect of mood on opposite-sex judgments of males' commitment and females' sexual intent

Shikkiah de Quadros-Wander, Department of Psychology, Deakin University, Melbourne, Australia.

Dr Mark Stokes, Department of Psychology, Deakin University, Melbourne, Australia. Email: mark.stokes@deakin.edu.au

Abstract: Gender differences in perceptions of sexual intent and commitment have been the subject of formal and informal inquiry for considerable time. One evolutionary theory, Error Management Theory (EMT), predicts that opposite-sex perceptions of female sexual intent and male commitment intent reflect intrinsic biases that minimize gender-specific evolutionary costs. The results supporting these hypotheses were obtained from subjects regardless of mood. We hypothesized that mood would influence ratings of sexual and commitment intent. Sixty participants (30 males, 30 females) were recruited and exposed to a positive and negative mood condition in counterbalanced groups using video stimuli. Preliminary analyses found an unexpected effect of order of mood induction, necessitating separate analyses of the Positive-Negative (PN) and Negative-Positive (NP) groups. Contrary to the original study, there were no gender effects. Positive moods led to increased ratings of both sexual and commitment intent across genders. Further, negative to positive mood-change was associated with significantly increased ratings. Both males and females attributed significantly higher sexual intent to same-sex rivals than themselves, but only males assessed themselves as having significantly higher commitment intent than same-sex rivals. The EMT model may require adaptation to acknowledge effects of variables such as mood on its predictions of gender-specific biases.

Keywords: evolutionary psychology; error management theory; sexual intent; commitment intent; gender differences; mood.

Introduction

Evolutionary theory interprets gender differences in sexual domains as resulting from differing biological function and reproductively adaptive goals of males and females

(Buss, 1995b; Grossman and Kaufman, 2002). Males, who cannot guarantee paternity, must compete for reproductively valuable females. Females, as guaranteed mothers carrying the primary burden of childbearing, are likely to prefer mates who can provide long-term support and commitment (Gangestad and Thornhill, 1997). These contrasting goals lead to the belief that males may seek short-term mates as ends in themselves, but females are more likely to concurrently assess short-term mates for long-term potential. Although reproductive goals are not the only variables influencing mate-selection, evolutionary psychologists propose that both genders must employ effective sexual strategies to acquire a romantic partner (Buss, 1995a). These themes underpin Sexual Strategies Theory (SST; Buss and Schmitt, 1993).

Sexual Strategies Theory (SST)

According to SST (Buss and Schmitt, 1993), both genders must engage in successful intrasexual competition (i.e. possessing qualities that favorably distinguish them from potential rivals) and intersexual competition (i.e. possessing qualities desired by potential partners). Meta-analyses supporting SST have shown that females have a greater preference than males for non-promiscuous partners (lower sexual intent), and although commitment is valued by females in short- and long-term mateships, males have been found not to desire commitment in short-term dating relationships.

Gender differences in mate-selective judgments are hypothesized to reflect varying priorities resulting from unequal parental investment. People predisposed to employ sexual strategies are assumed to be more reproductively successful, causing a prevalence of these genes in the population (Bjorklund and Shackelford, 1999). Since the 1980s, researchers have investigated gender differences in sexual intent (hereafter SI) perception (Abbey, 1982; DeSouza, Pierce and Zanelli, 1992; Koukounas and Letch, 2001). The general consensus of such studies has been that males overestimate female-SI compared to female ratings of other females or themselves. Evolutionary psychologists suggest that males have inherited a biological propensity to over-infer female-SI because it maximizes reproductive opportunities (Wilson and Daly, 1997). One evolutionary theory to address male overestimation of female-SI is Error Management Theory (EMT; Haselton and Buss, 2000).

Error Management Theory (EMT)

Consistent with SST, Haselton and Buss (2000) suggested that opposite-sex perceptions are shaped by gender-specific reproductive goals stemming from unequal parental investment, thereby necessitating error management. Broadly, error management in decision-making describes cognitive biases that minimize the likelihood of making the most costly mistake in situations with unpredictable outcomes (Friedrich, 1993). According to EMT, males should be prone to Type I errors by over-estimating female-SI and avoiding the Type II error (false negative) of failing to recognize a sexual opportunity. Alternatively, females should be more likely to commit Type II errors by being skeptical of male commitment intent (hereafter CI), thus avoiding a costly Type I error (false positive) and

wrongly inferring a male's long-term intentions.

Haselton and Buss (2000) suggested that an accurate measure of each gender's SI or CI lay between self and third-party same-sex ratings. Self ratings should reflect self-enhancement and reputation-maintenance patterns (i.e., lower SI and higher CI) relative to third-party same-sex ratings which should reveal derogatory assessments of rivals (i.e. higher SI and lower CI; Einon, 1994). Overestimation or underestimation was inferred if opposite-sex ratings fell above or below both criteria respectively. These accuracy measures reflect the intrasexually competitive biases described by SST. Haselton and Buss tested their hypotheses using questionnaires that asked participants to rate dating behaviors for SI or CI depending on whether these behaviors were performed by another male, another female, or themselves.

Haselton and Buss (2000) provided data supporting the hypothesis that males overestimate female-SI, consistent with previous literature. Tentative preliminary support was also given for a new hypothesis that females underestimate male-CI. Commitment has previously been studied as a characteristic of real relationships, but not as an assessed quality of potential mates. Such studies have consistently referred to Rusbult's (1980) investment model which identifies three factors loading on commitment: satisfaction, investment, and quality of alternatives (Rusbult, Martz, and Agnew, 1998). As Haselton and Buss did not discuss how CI perception could be interpreted by or integrated into this existing theoretical framework, commitment perception remains a relatively new construct.

Measurement tools

The authors designed and utilized two questionnaires to measure SI and CI perceptions: the Sex and Commitment Contrast Instrument (SCCI) which assessed self and opposite-sex ratings; and the Cross-Sex Perception Instrument (CSPI) which assessed self, opposite-sex and third-party same-sex ratings. The authors did not report effect sizes. Manual calculations revealed that the SCCI and CSPI produced effect sizes of 9.6% and 32.5% respectively for the difference between female self-SI perceptions and male perceptions of female-SI. Similarly, the effect sizes for female underestimations of male-CI relative to male self-CI ratings were 10.1% on the SCCI and 35.7% on the CSPI. Despite the SCCI and the CSPI reportedly measuring the same constructs, the discrepant effect sizes suggest that these instruments do not produce comparable measurements of sexual intent and commitment.

The hypothesized effect of mood on EMT predictions

A recent publication by Haselton and Nettle (2006) acknowledged that avoiding costly decisions is often dependent on context. The authors also presented evidence that emotion exerts a significant influence upon people's perceptions of others and can moderate the adaptive nature of cognitive biases. The error-management model therefore appears to be able to accommodate multiple factors. Research strongly suggests that people's baseline mood state is contented rather than neutral most of the time (Diener and Diener, 1996; Cummins, 2003), indicating that Haselton and Buss' (2000) sample is likely

to represent perceptions of males and females in generally positive mood states.

However, different theories of mood introduce competing hypotheses within the EMT framework which warrant investigation. On the one hand, positive moods have been associated with heuristic reasoning (Park and Banaji, 2000) and low-effort processing (Forgas, 1998). On the other hand, mood congruency theory states that people in positive or negative moods attend more easily to similarly valenced information (Russell, 2003). If it is accepted that the EMT biases around reproductive goals constitute default cognitions for males and females, the following predictions are made.

According to mood heuristics, happy males should also make higher ratings of female-SI than unhappy males due to this being their default cognition. According to mood congruency theory, happy males should be more attentive to positive cues and thus make higher ratings of female-SI than unhappy males. In both cases, happy males are predicted to make higher ratings of female-SI than unhappy males. Mood heuristics also support the predictions of EMT, that happy females would be more likely to rate male-CI lower than unhappy females as this is their biological bias. However, mood congruency theory would predict that happy females would optimistically rate male-CI higher than unhappy females.

It is therefore not known whether being in a positive mood would inflate or deflate female ratings of male CI. It is also unclear whether males in a negative mood would still overestimate female-SI. Furthermore, it is vital to account for the effect of mood on self and same-sex ratings of SI and CI as they provide the criteria by which EMT biases are established. It is valuable to investigate the effect of mood on people's perceptions of SI and CI, particularly as the early stages of mate-selection tend to occur in social settings which are generally mood-rich environments (May and Hamilton, 1980). In summary, the effect of mood on people's perceptions of themselves and others are all of interest in expanding the EMT model.

Hypotheses

This study sought to expand Haselton and Buss' (2000) research to determine whether the biases predicted by EMT are present under positive and negative mood conditions. It was expected that positive and negative moods would modulate the SI and CI perceptions observed by Haselton and Buss (note competing hypotheses 1b and 1c):

- *Hypothesis 1a*: Males in a positive mood should make higher estimations of female-SI than males in a negative mood.
- *Hypothesis 1b*: According to mood congruency theory, females in a positive mood should make higher estimations of male-CI than females in a negative mood.
- *Hypothesis 1c*: According to mood heuristics, females in a positive mood should make lower estimations of male-CI than females in a negative mood.

Consistent with SST, it was also expected that intrasexually competitive perceptions should reflect reputation-maintenance and competitor-derogation biases. Therefore, self and third-party same-sex ratings (on which the accuracy criteria of EMT are based) should only differ significantly in domains valued by the opposite-sex. The following hypotheses

are therefore generated:

- *Hypothesis 2a*: Males should demonstrate intrasexually competitive biases in SI and CI perceptions (as both are valued by females).
- *Hypothesis 2b*: Females should demonstrate intrasexually competitive biases in SI only (as this is valued by males).

Materials and Methods

Participants

The sample comprised 60 undergraduate students from Deakin University, 30 females and 30 males. The mean age of female and male participants was 23.3 years ($SD=5.1$) and 28.7 years ($SD=8.8$) respectively [$t(58)=-2.12$, $p<0.05$]. Power analyses established that 60 participants would detect a small effect, corresponding to $F(1,57)=5.9$ and $p\eta^2=.169$.

Materials

A mood questionnaire was created using the circumplex model of affect (Russell, 2003). The model provides a circular depiction of mood on two dimensions, pleasantness (x -axis) and activation (y -axis). Davern (2004) extended the model by locating specific moods on the circumplex perimeter with a corresponding angle. Twelve moods were sampled, three from each quadrant which equally covered the four combinations of activation and pleasantness. Participants used a scale between 0 (*Not at all*) and 10 (*Completely*) to indicate the strength of each mood. This questionnaire was completed as a control, then immediately following each of two mood induction videos.

To replicate Haselton and Buss' (2000) research, the Sex and Commitment Contrast Instrument (SCCI) was obtained to measure SI and CI perceptions. Some items on the paper-and-pencil questionnaire were slightly altered to conform to Australian terminology. Three versions were generated for self targets, opposite-sex targets and third-party same-sex targets. Participants were asked to rate the likelihood that each of the 15 behaviors listed indicated SI or CI on the part of the target when occurring in the context of a short-term heterosexual dating relationship. Ratings were made on a 7-point scale anchored at -3 (*Extremely Unlikely*), 0 (*Neither Likely nor Unlikely*) and +3 (*Extremely Likely*). Although the authors only used the SCCI to assess self and opposite-sex ratings, a third-party same-sex form was constructed for consistent comparison. The CSPI was substantially longer, making it less appropriate for a repeated-measures design (refer Haselton and Buss, 2000). Videos have been found effective for inducing mood (Forgas, 1998); therefore, two videos were selected, each lasting around four minutes. Footage from the 2001 September 11th attacks was used to evoke negative moods. A clip from a New York performance of an American comedian, Pablo Francisco, was used to elicit positive moods as per prior

research (Demaree, Schmeichel, Robinson and Everhart, 2004).

Procedure

Participants were recruited from lectures on a voluntary basis and asked to participate in a study examining people's perceptions of whether certain behaviors signaled SI or CI. Although participants were told they would be undergoing two mood inductions, they were not informed that gender differences were the primary focus of the experiment. Participants were tested in same-sex groups of one to three at a time with a female researcher.

Participants did not complete the SCCI in the control condition given time constraints on testing. Upon providing demographic information, participants completed a control mood questionnaire and were allocated to the Positive-Negative (PN) or Negative-Positive (NP) condition. After the first video was viewed, participants completed a second mood questionnaire followed by the three versions of the SCCI. These questionnaires were again completed after the second mood induction. Upon completion, participants were debriefed as to expected gender effects.

Design

Using the same method as Haselton and Buss (2000), averages of SI and CI items formed two composite scores for each questionnaire, constituting the dependent variables of SI and CI. To test the first hypothesis, repeated-measures MANOVAs were conducted for each dependent variable using mood as the within-subjects factor and gender as the between-subjects factor. Bonferroni-corrected planned contrasts were used to calculate the significance of gender differences between self and opposite-sex ratings, and again between opposite-sex and third-party same-sex ratings. To test the second hypothesis, a doubly repeated-measures MANOVA was used to assess the significance of differences within and between genders for ratings of self and other same-sex members.

The circumplex model was transposed on to a unit circle (radius of 1) which allowed each item to be identified by a mood (angle) and its intensity (0–10, denoted by the distance of the point from the origin). The circular nature of the data was removed by multiplying the cosine and sine of each mood by the mood strength indicated (Fisher, 1993). Each subject's average mood was calculated by taking the mean of moods rated stronger than the median response. Variance attributable to mood was calculable by the sine (activation) coordinates and cosine (pleasantness) coordinates for subjects in each mood state.

The effect of the testing condition (PN or NP) was assessed with a repeated-measures MANOVA using condition and gender as between-subjects factors and mood as the within-subjects factor. The analysis was repeated treating mood as a covariate to check whether gender effects were being obscured or enhanced by the variable.

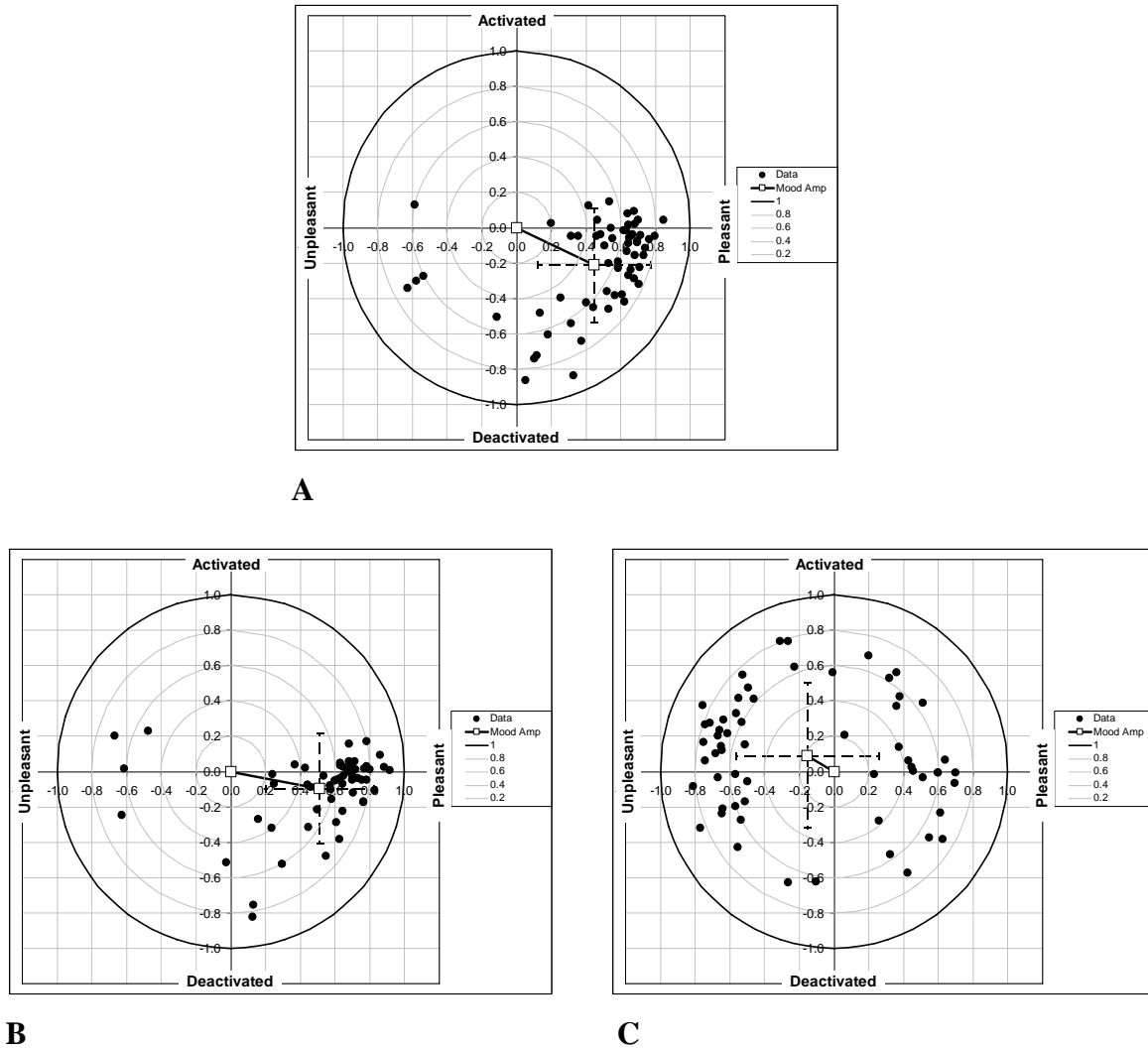
Results

Data screening and cleaning were undertaken prior to analyses. No univariate or multivariate outliers were present in the data set. Tests of skewness and kurtosis revealed no violations of normality. Reliabilities of SI and CI composites for both genders on each scale for both moods were of an acceptable level with a minimum of $\alpha=.76$. Counterbalancing of mood inductions was analysed with a repeated-measures MANOVA using mood and condition (PN or NP) as within- and between-subjects variables respectively. Significant interactions of mood and condition were found for judgments of both female-SI ($F_{1,57}=10.1$, $p<.01$, $p\eta^2=.148$) and male-CI ($F_{1,57}=6.7$, $p<.05$, $p\eta^2=.104$), necessitating separate analyses.

The effects of mood inductions for all subjects are presented in Figures 1A–1C. On average, the positive mood induction did not alter subject mood from their control point (refer Figs. 1A and 1B). The negative mood induction caused higher activation and a spread of data between pleasantness and unpleasantness (refer Fig. 1C).

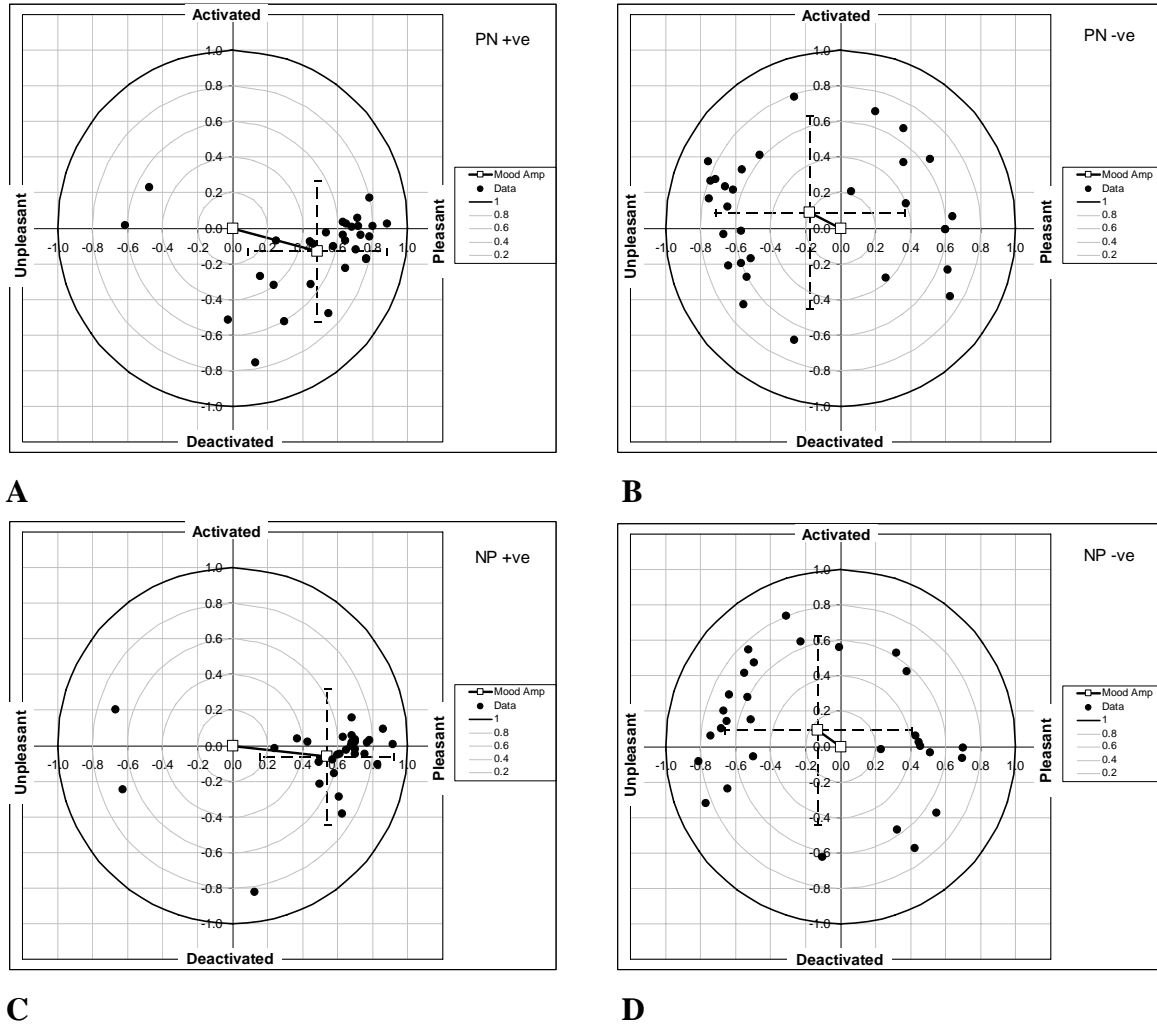
The effect of mood on opposite-sex judgments

Figure 1: Mood ratings for all subjects: **A.** Control mood ($N=60$); **B.** Positive mood ($N=60$); **C.** Negative mood ($N=60$).



The PN and NP groups responded similarly to each mood stimulus (refer Figs. 2A–2D).

Figure 2: Positive and negative mood ratings for PN and NP groups: **A.** Positive mood in PN group ($N=30$); **B.** Negative mood in PN group ($N=30$); **C.** Positive mood in NP group ($N=30$); **D.** Negative mood in NP group ($N=30$).



Circular statistics were used to ascertain the significance of mood change for the PN and NP groups (Fisher, 1993). Once circular means and variances were derived these were used to calculate circular corrected t -tests. This is required as angular data are not distributed as linear data (i.e., the linear amp mean of 359 degrees and 1 degrees would be 180 degrees, which is incorrect, while the circular mean is 360 or 0 degrees).

As can be seen from Table 1, the difference between mean positive and mean negative moods for the NP condition was 208.42 degrees, which was significant ($Z=5.10$, $p<0.001$). The difference between mean positive and mean negative moods for the PN condition was 191.77 degrees, which was significant ($Z=5.33$, $p<0.001$). The difference between mean negative and mean control moods for the NP condition was 110.05 degrees, which was significant ($Z=5.68$, $p<0.001$). The difference between mean negative and mean

The effect of mood on opposite-sex judgments

control moods for the PN condition was 103.45 degrees, which was significant ($Z=4.69$, $p<0.001$). The difference between mean positive and mean control moods for the NP condition was 14.40 degrees, which was not significant ($Z=0.14$, $p>0.05$). The difference between mean positive and mean control moods for the PN condition was 16.77 degrees, which was not significant ($Z=0.15$, $p>0.05$).

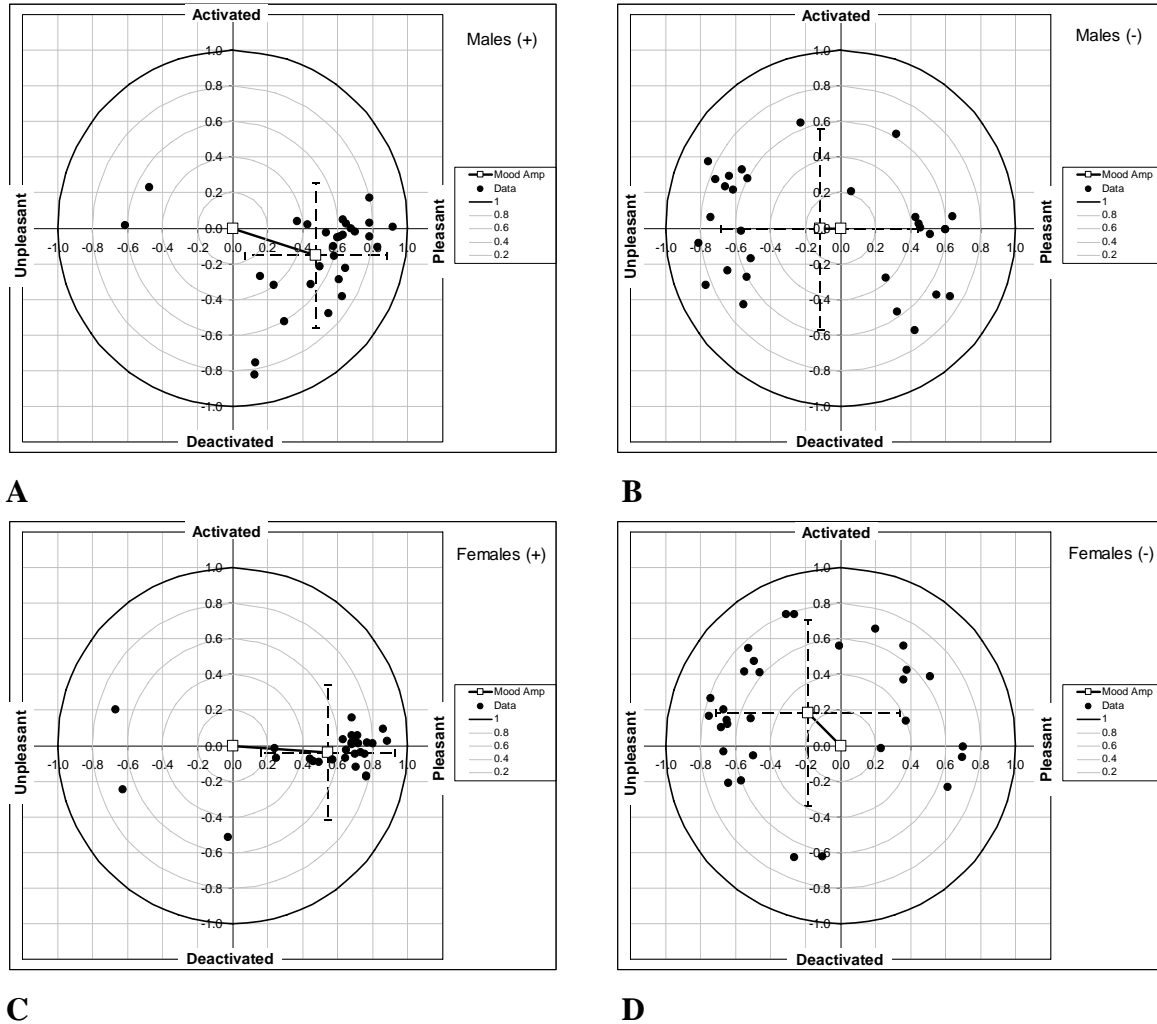
In summary, Table 1 shows that in both groups the negative mood was significantly different from the positive and control moods, but the positive and control moods did not differ significantly from each other. This finding is consistent with the strong empirical evidence that people’s baseline (control) mood state is positive (Diener and Diener, 1996; Forgas, 1998; Cummins, 2003).

Table 1. Mean mood measurements for NP and PN groups in Control, Positive and Negative mood conditions.

	<i>Mean 1: Positive mood</i>		<i>Mean 1: Negative mood</i>		<i>Mean 1: Positive mood</i>	
	<i>Mean 2: Negative mood</i>		<i>Mean 2: Control mood</i>		<i>Mean 2: Control mood</i>	
	NP	PN	NP	PN	NP	PN
Mean 1 (Deg)	353.29	345.15	144.87	153.39	353.29	345.15
Mean 2 (Deg)	144.87	153.39	338.89	328.38	338.89	328.38
Diff (Deg)	208.42	191.76	165.98	185.01	14.40	16.77
SD 1 (Deg)	63.38	67.46	110.05	103.45	63.38	67.46
SD 2 (Deg)	110.05	103.45	59.17	76.47	59.17	76.47
Z	5.10	5.33	5.68	4.69	0.14	0.15
P	1.7E-07	4.8E-08	6.6E-09	1.3E-06	0.45	0.44

In general, males displayed more variable responses to both mood inductions than females (refer Figs. 3A–3D). Both genders reported similar pleasantness levels for the same moods, with males slightly more deactivated in both. It appears gender differences were not due to inconsistent experiences of the mood inductions.

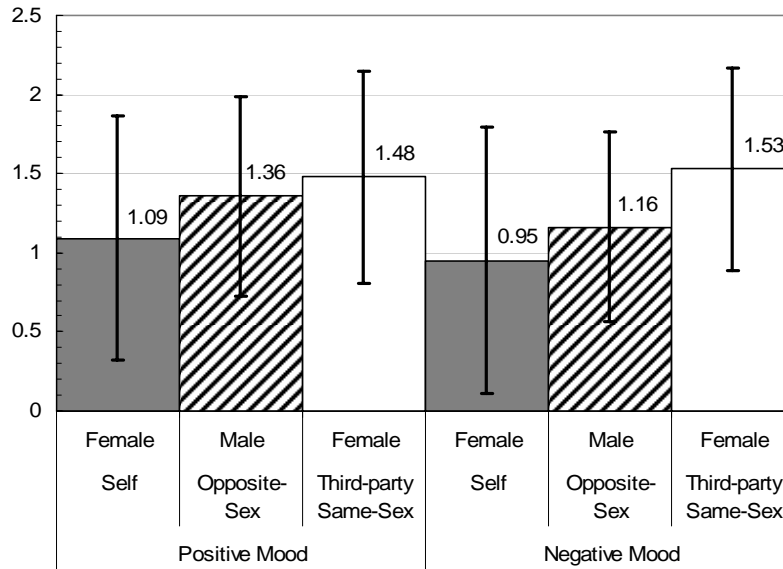
Figure 3. Positive and negative mood ratings for males and females: **A.** Positive mood, males only ($N=30$); **B.** Negative mood, males only ($N=30$); **C.** Positive mood, females only ($N=30$); **D.** Negative mood, females only ($N=30$).



Female sexual intent: Overall results

To examine whether males overestimate female-SI in positive and negative moods, male ratings of female-SI were compared to Haselton and Buss' accuracy criteria: female ratings of their own and other females SI. Overestimation was inferred if male ratings significantly exceeded both measures. In general, male ratings of female-SI were accurate (Fig. 4).

Figure 4. Male and female mean ratings ($\pm SD$) of female sexual intent in positive and negative moods for all subjects ($N=60$).

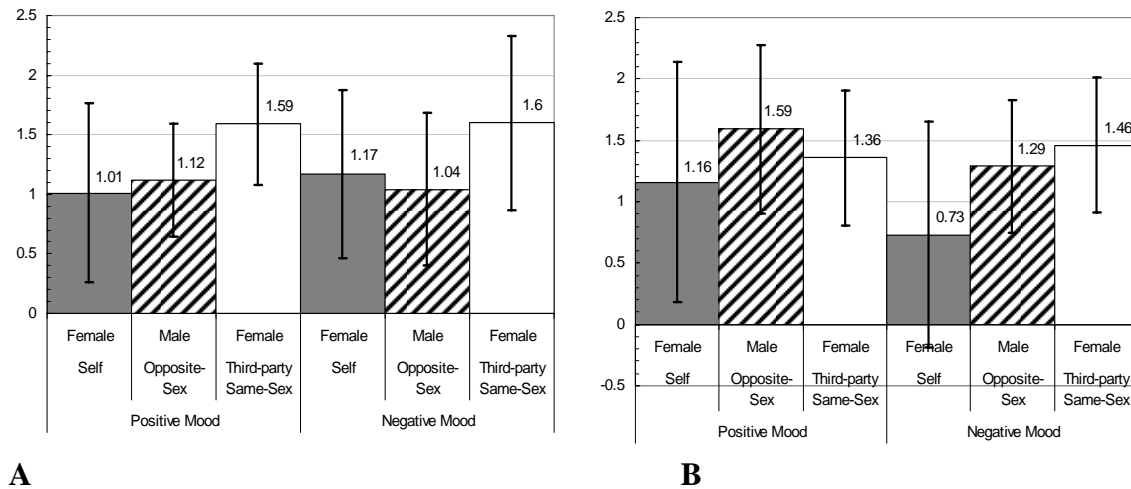


Female sexual intent: Male ratings v female self ratings

PN group (Fig. 5A): In the PN group, no significant interaction of mood and gender was detected ($F_{1,27}=1.72$, $p=ns$, $p\eta^2=.058$). Additionally, no significant effects were found for gender ($F_{1,27}=.002$, $p=ns$, $p\eta^2=.000$) or mood ($F_{1,27}=.14$, $p=ns$, $p\eta^2=.005$). When positive moods preceded negative moods, stable gender effects were not observed in either mood, nor did this mood-change significantly alter ratings of either gender.

NP group (Fig. 5B): In the NP group, no significant interaction was observed between mood and gender ($F_{1,27}=.60$, $p=ns$, $p\eta^2=.021$). Although no main effect of gender was noted ($F_{1,27}=3.05$, $p=ns$, $p\eta^2=.098$), the effect size of .098 appears to have been masked by extreme variability in female self-SI ratings ($SD_{Positive}=.98$, $SD_{Negative}=.92$). Pairwise comparisons of negative mood data revealed male ratings of female-SI were significantly greater than female self-SI ratings ($F_{1,27}=4.05$, $p<.05$, $p\eta^2=.126$). When a positive mood followed a negative mood, males and females significantly increased SI ratings of females and themselves respectively ($F_{1,27}=19.3$, $p<.001$, $p\eta^2=.408$). Male ratings of female-SI exceeded female self-SI ratings in both moods, though not significantly.

Figure 5. Male and female mean ratings ($\pm SD$) of female sexual intent in positive and negative moods: **A.** PN group ratings ($N=30$); **B.** NP group ratings ($N=30$).



Female sexual intent: Male ratings v female ratings of other females

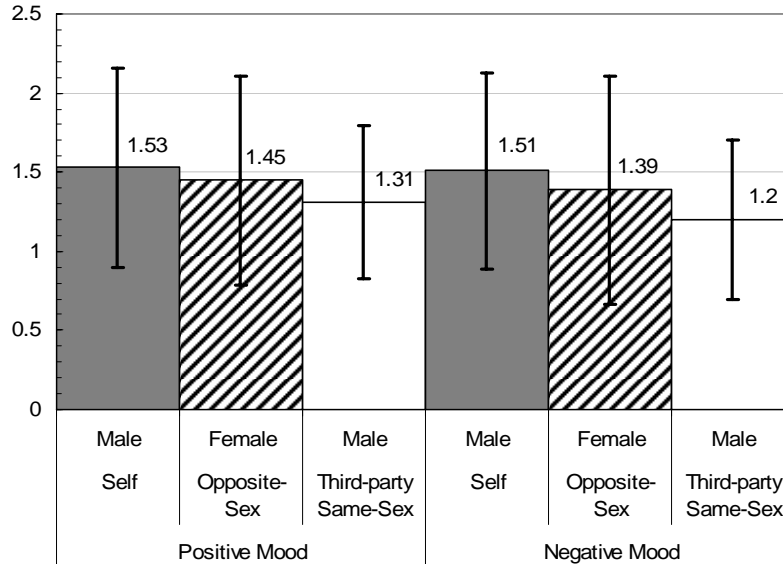
PN group (Fig 5A): Examination of male ratings against female ratings of other females revealed no interaction of mood and gender ($F_{1,27}=.38, p=ns, p\eta^2=.013$). However, females rated other females' SI significantly higher than males did ($F_{1,27}=6.35, p<.05, p\eta^2=.185$). No main effect of mood was found ($F_{1,27}=.253, p=ns, p\eta^2=.009$). The results indicate that regardless of mood, females made higher ratings of other females' SI relative to male ratings of females. Further, the induction of negative moods following positive moods did not significantly alter ratings by either gender.

NP group (Fig. 5B): A significant interaction between mood and gender was observed in the NP group ($F_{1,27}=8.93, P<.01, p\eta^2=.242$). Simple main effects analyses revealed that in positive and negative moods, males rated female-SI similarly to females ratings of other females (Positive mood: $F_{1,27}=.99, p=ns, p\eta^2=.034$; Negative mood: $F_{1,27}=.75, p=ns, p\eta^2=.026$). However, while the NP mood-change did not significantly alter female ratings of other females' SI ($F_{1,12}=1.07, p=ns, p\eta^2=.037$), males significantly increased their ratings of female-SI ($F_{1,12}=10.2, p<.01, p\eta^2=.267$).

Male commitment intent: Overall results

To test whether females underestimate male-CI, female ratings were compared to male ratings of their own or self-CI and other males' CI. Underestimation was inferred if female ratings fell significantly below these accuracy criteria (Haselton and Buss, 2000). Overall, females made accurate ratings of male-CI (Fig. 6).

Figure 6. Male and female mean ratings ($\pm SD$) of male commitment intent in positive and negative moods for all subjects ($N=60$).

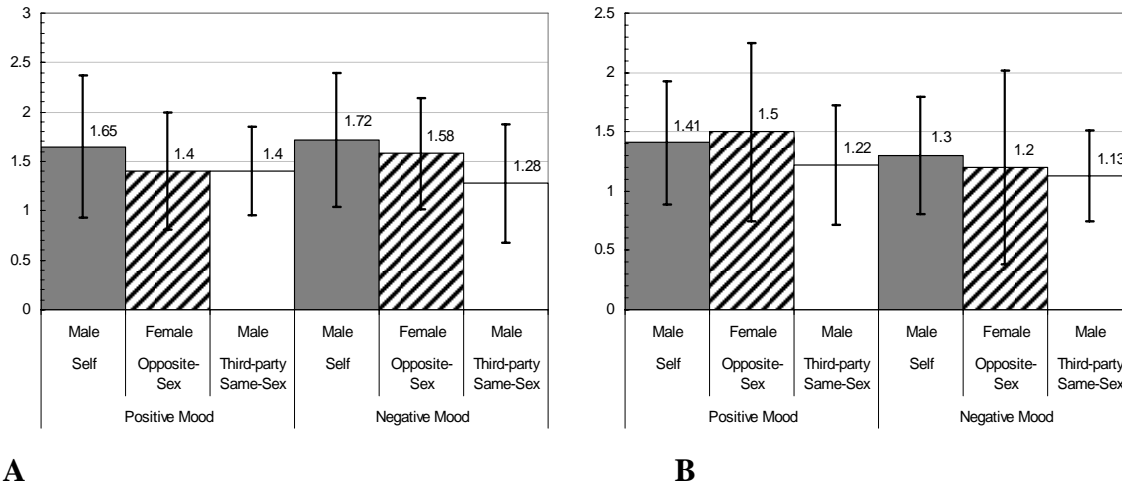


Male commitment intent: Female ratings v male self ratings

PN group (Fig. 7A): No significant interaction of mood and gender was found ($F_{1,27}=.354$, $p=ns$, $p\eta^2=.012$). No main effects were detected for gender ($F_{1,27}=.853$, $p=ns$, $p\eta^2=.03$) or mood ($F_{1,27}=1.84$, $p=ns$, $p\eta^2=.062$). Figure 7A shows that when positive moods were induced before negative moods, females rated male-CI lower than males rated self-CI in both moods, though not significantly so. The PN mood-change did not significantly alter ratings of either gender.

NP group (Fig. 7B): Figure 7B reveals that in a negative mood, females rated male-CI lower than males rated self-CI, with the reverse being the case in a positive mood. However, the interaction of mood and gender was not significant ($F_{1,27}=1.14$, $p=ns$, $p\eta^2=.039$). No main effect of gender was observed ($F_{1,27}=.000$, $p=ns$, $p\eta^2=.000$). A main effect of mood was found ($F_{1,27}=5.47$, $p<.05$, $p\eta^2=.163$), indicating that both genders made increased ratings when moving from a negative to positive mood.

Figure 7. Male and female mean ratings ($\pm SD$) of male commitment intent in positive and negative moods: **A.** PN group ratings ($N=30$); **B.** NP group ratings ($N=30$).



Male commitment intent: Female ratings v male ratings of other males

PN group (Fig. 7A): An interaction of mood and gender was found in the PN group ($F_{1,27}=6.24, p<.05, p\eta^2=.182$). Simple main effects analyses revealed no significant difference between female ratings of male-CI and male ratings of other males' CI in positive ($F_{1,27}=.000, p=ns, p\eta^2=.000$) or negative ($F_{1,27}=1.97, p=ns, p\eta^2=.066$) moods. Male ratings of other males' CI were not affected by the PN mood-change ($F_{1,12}=1.88, p=ns, p\eta^2=.063$), but female ratings of male-CI significantly increased ($F_{1,12}=4.67, p<.05, p\eta^2=.143$).

NP group (Fig. 7B): In the NP group, no significant interaction of mood and gender was observed ($F_{1,27}=1.65, p=ns, p\eta^2=.056$) nor were gender effects found for either mood ($F_{1,27}=.658, p=ns, p\eta^2=.023$). Female ratings of male-CI were greater than male ratings of other males' CI in both moods, though not significantly. However, a main effect of mood was found ($F_{1,27}=6.04, p<.05, p\eta^2=.177$) for female and male ratings of other males' CI; the NP mood-change was associated with significantly increased ratings by both genders.

Covariates

This sample comprised older males ($M=28.7$) and females ($M=23.3$) than those used by Haselton and Buss (2000; $M(\text{Male})=19.25, M(\text{Female})=19.14$). Therefore, age was removed as a covariate. No additional interactions or effects were revealed. To further ascertain whether results were influenced by age, each gender was split at their median (26 years for males, 24 years for females) and analyses were repeated on these groups (younger

and older) to test for age-specific effects. The results did not differ from those reported above. Removing mood as a covariate (using the variance attributable to cosine (pleasantness) and sine (activation)) also failed to detect additional interactions or main effects in any of the above results.

Comparison of means

To test whether these results significantly differed from those reported by Haselton and Buss' (2000), *t*-tests were conducted on self and opposite-sex means of SI and CI. Data presented in Table 2 revealed the present results do not significantly differ from Haselton and Buss' results for CI by either gender. However, females in this sample made significantly higher estimations of self-SI in both mood conditions than females in Haselton and Buss' sample. Third-party same-sex comparisons were not made as different instruments were used between studies.

Table 2. Differences between composite ratings for sexual intent and commitment intent

Rater	Target	Category	Mood	Current Study			Haselton and Buss			<i>t</i>	<i>df</i>	Sig
				<i>M</i> ₁	<i>SD</i> ₁	<i>N</i> ₁	<i>M</i> ₂	<i>SD</i> ₂	<i>N</i> ₂			
Female	Self	SEX	Pos	1.09	.77	30	.13	1.60	168	3.22	196	.01
			Neg	.95	.84	30	(as above)			2.74	196	.01
	Opp	COM	Pos	1.45	.66	30	1.21	.74	168	1.66	196	ns
			Neg	1.39	.72	30	(as above)			1.23	196	ns
Male	Self	COM	Pos	1.53	.63	30	1.65	.50	121	-1.12	149	ns
			Neg	1.51	.62	30	(as above)			-1.31	149	ns
	Opp	SEX	Pos	1.36	.63	30	1.02	.90	121	1.95	149	ns
			Neg	1.16	.60	30	(as above)			.81	149	ns

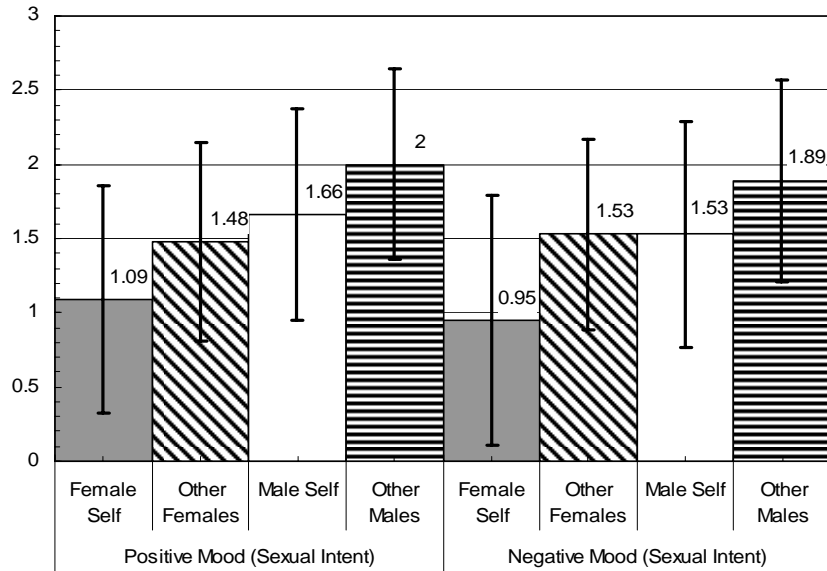
Note: Haselton and Buss (2000) did not assess mood – negative and positive mood composites from the present study are therefore compared against composites obtained without mood induction.

Differentiation of self from same-sex rivals

To assess intrasexually competitive perceptions of SI, male and female ratings of self-SI were compared to ratings of third-party members of their gender group (Fig. 8). The term 'target' denotes who was rated, self or others. No significant interactions were present between target, gender and mood ($F_{1,57}=.93$, $p=ns$, $p\eta^2=.016$), target and gender ($F_{1,57}=1.46$, $p=ns$, $p\eta^2=.025$), target and mood ($F_{1,57}=1.57$, $p=ns$, $p\eta^2=.026$), or mood and gender ($F_{1,57}=.613$, $p=ns$, $p\eta^2=.010$). A main effect of target was present ($F_{1,57}=52.9$,

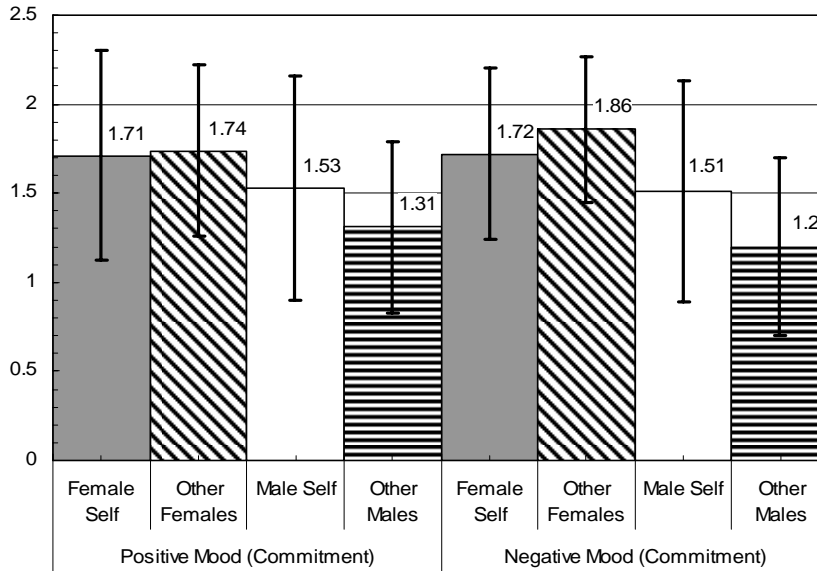
$p < .001$, $p\eta^2 = .477$), with both genders differentiating themselves as having significantly lower SI than other same-sex members. A gender effect was also observed ($F_{1,57} = 9.89$, $p < .01$, $p\eta^2 = .146$) with male ratings of themselves and other males significantly exceeding female ratings of themselves and other females. Mood did not significantly alter SI ratings ($F_{1,57} = 2.52$, $p = ns$, $p\eta^2 = .042$).

Figure 8. Male and female mean ratings ($\pm SD$) of sexual intent for self and third-party same-sex targets in positive and negative moods for all subjects ($N = 60$).



To assess intrasexually competitive perceptions of CI, male and female ratings of self-CI were compared to third-party same-sex ratings (Fig. 9). Significant interactions were not detected for mood, gender and target ($F_{1,57} = 1.91$, $p = ns$, $p\eta^2 = .032$), mood and gender ($F_{1,57} = 2.36$, $p = ns$, $p\eta^2 = .039$) or mood and target ($F_{1,57} = .026$, $p = ns$, $p\eta^2 = .000$), but a significant target by gender interaction was found ($F_{1,57} = 17.38$, $p < .001$, $p\eta^2 = .231$). Subsequent simple main effects analyses revealed no significant gender differences between ratings of self-CI ($F_{1,57} = 2.00$, $p = ns$, $p\eta^2 = .033$), but females rated other females' CI significantly higher than males rated other males' CI ($F_{1,57} = 22.99$, $p < .001$, $p\eta^2 = .284$). Additionally, no significant difference was observed between female ratings of self-CI and other females' CI ($F_{1,27} = 2.04$, $p = ns$, $p\eta^2 = .034$), but males rated their self-CI significantly above other males ($F_{1,27} = 19.97$, $p < .001$, $p\eta^2 = .256$).

Figure 9. Male and female mean ratings ($\pm SD$) of commitment intent for self and third-party same-sex targets in positive and negative moods for all subjects ($N=60$).



Discussion

This study initially intended to draw comparisons between subjects in positive and negative moods. The significant effect of the testing condition (NP or PN) on mood transformed the study into an investigation of the effect of mood-change on SI and CI ratings of the self, potential mates and potential rivals, making it impossible to test hypotheses 1a, 1b and 1c. In general however, mood was observed to have an interesting effect on opposite-sex perceptions of female-SI and male-CI.

In this study, males were generally not found to overestimate female-SI with ratings falling within Haselton and Buss' (2000) accuracy criteria. The only exception to this was detected in the NP group, where males who had previously been in a negative mood made higher ratings of female-SI when exposed to the positive mood induction, though this still did not significantly exceed the accuracy criteria. In the NP group, the negative to positive mood-change was also associated with significant increases in male ratings of female-SI and self-SI ratings. However, in the PN group, the mood-change from positive to negative did not result in a significant increase or decrease in ratings of female-SI. The mood change from negative to positive appears to have an inflationary effect on how females rate self-SI and on how males rate female-SI. It is possible that a greater number of subjects would have detected a male overestimation bias in the NP group's positive mood condition.

The expectation that females would underestimate male-CI was not supported in either group within positive or negative mood-states. However, the change in mood appeared to affect some ratings. In the NP group, female ratings of male-CI and male

ratings of themselves and of other males were similar, though all three ratings significantly increased as a result of the positive mood induction. In the PN group, female ratings remained within the range of accuracy, but significantly increased with a shift in mood. That is, females seemed more inclined to attribute CI to males after their mood changed from positive to negative. The increase in female ratings of male-CI in all groups is not explained by mood-change or by EMT. It may be that regardless of mood, females were more likely to attribute greater CI to males upon second exposure to the questionnaire items, though this is only retrospective speculation.

Hypotheses 2a and 2b predicted that self-SI and self-CI ratings would differ significantly from ratings of other same-sex members for qualities desired by the opposite-sex. The results support these hypotheses with males displaying intrasexual competitiveness for both SI and CI and females displaying intrasexual competitiveness for SI judgments only. These results are congruent with previous findings and the SST model (Buss and Schmitt, 1993) which predicts that males value SI only and females value both SI and CI. More specifically, both genders appear to accurately perceive each others' mate-preferences in short-term dating situations.

Error Management Theory states that in the domain of mate-selection, males and females will minimise the error associated with the greatest evolutionary cost. These data do not wholly support this theory in light of the effect of mood-change on ratings. In this study, regardless of mood, males did not overestimate female-SI according to Haselton and Buss' criteria, nor did females underestimate male-CI. However, these data do suggest that people's perceptions of SI and CI in potential mates are not stable and can be affected by changes in their mood. Moreover, the accuracy of these perceptions also depends on the mood of the target.

From the standpoint of EMT, negative moods may signal an environment not conducive to reproduction, thereby reducing SI and CI ratings. If this were the case, gender effects should be enhanced by positive moods. This was not established. The absence of gender effects may be better explained by the centralising effect of mood. Comparisons of Haselton and Buss' (2000) data with the present results revealed the means from these data tended to be higher, but not significantly so, while the standard deviations were considerably lower, particularly for SI ratings (see Table 2). Thus, exposing male and female participants to the same mood stimuli results in more homogenous ratings. Therefore, we may expect that when people are exposed to the same mood-inducing external cues, they may make more accurate judgments of the SI and CI of potential partners.

This study found that most of the significant mood effects occurred because males and females made lower ratings of SI and CI in negative moods, particularly in the NP group. The exception to this was in the PN group for female ratings of male-CI. Given the anomaly of this finding, mood effects are discussed in relation to the rest of the data. In terms of non-evolutionary mood theories, the general absence of mood effects in the PN group may indicate that people in a positive mood resist an imposed negative mood shift (Clark and Isen, 1982). Conversely, the many significant mood effects throughout the NP group may reflect a motivation to improve mood by those placed initially in a negative mood, reflecting a bias toward happiness (Forgas, 1998; Cummins, 2003). In this sense, the

reproductive goals of EMT may be eclipsed by the bias towards maintaining or returning to a positive mood state. With this in mind, reproductively adaptive biases may not always emerge under naturalistic conditions which require the management of multiple errors.

Evolutionary theory states that high SI is not valued in prospective partners – this is empirically supported with both genders attributing higher SI to same-sex members than themselves (competitor-derogation). However, self ratings by both genders also demonstrated a belief that some SI is desired by the opposite-sex. Positive moods led to increased SI ratings of all targets, thereby raising the threshold for what is considered appropriate SI (self ratings) and what is considered inappropriately high SI (ratings of same-sex others). People's perceptions of SI implied by their own and others' behaviour will therefore be influenced by mood. These results suggest that incongruence between the mood of actors and recipients may contribute to misinterpreted sexual advances, which are often only explained with reference to male overestimation tendencies.

Relative to Haselton and Buss' (2000) sample, females in this study rated their SI significantly higher. If self ratings reflect self-enhancement biases, these data may imply that the perception of desirable qualities is not stable across cultures. Other researchers have made similar claims (Buss, 1989; Toro-Morn and Sprecher, 2003). If intrasexually-competitive biases constitute EMT's accuracy criteria, and these biases are influenced by culture-specific mate-preferences, EMT's predictions for SI and CI perceptions may not be supported across all social contexts. This raises interesting questions for cross-cultural interactions where the accuracy criteria may shift for raters but not targets, or vice versa. The potential for misreading sexual and commitment-oriented behaviours of people from different cultural backgrounds seems probable given the data from this study.

Haselton and Buss (2000) used same-sex experimenters with participants, while all subjects in this study had a female researcher. However, it is unlikely this difference impacted on the current study. If it had, male ratings should have been affected while female data remained stable. The data were contrary to this: only female assessments of self-SI in the present study differed significantly from Haselton and Buss' results (see Table 2), suggesting that the female researcher did not affect male ratings. Consequently, it seems reasonable to conclude that the most salient differences between the present study and that of Haselton and Buss – the mood induction and a different cultural sample – led to amplified female responses.

The SCCI was not administered in the control condition as the testing protocol already took 45 minutes to one hour of participants' time. To use the SCCI in the control condition would have added another 15 minutes to an already time-consuming procedure. Although the key aim of the study was to examine whether EMT biases shifted under positive and negative mood conditions, it is certainly possible that the predicted sex differences may have been revealed by administering the SCCI in the control condition. This would contradict our conclusion that the obtained results were partially a result of culture, and attribute the findings to the mood induction alone.

In summary, if mood centralises people's perceptions of themselves and others, there is a greater likelihood that opposite-sex and self perceptions will follow less variable patterns in mood-inducing situations than in neutral settings. This data has ecological significance given that initial contact with potential mates, particularly for younger people,

often occurs in mood-rich environments such as nightclubs or bars. The results suggest that people who commence in negative moods and move to positive environments are likely to make significantly higher estimates of other people's SI and CI once mood-change has occurred. The implications of this are considerable for sexual perceptions, and subsequent behaviour, of people who experience mood-change in this order. There may be severe repercussions for people with mood disorders whose inflated (and possibly erroneous) perceptions may be at odds with those of an opposite-sex target.

Given that these results contradict those of Haselton and Buss (2000) concerning SI and CI perceptions, it is clear future research is required to establish the veracity of these effects. Investigations into CI perception may utilise an adaptation of Rusbult's (1980) investment model. The model is a robust predictor of commitment that has revealed gender differences interpretable by EMT, such as females reporting higher commitment than males, and males reporting the perception of more relationship alternatives than females (Le and Agnew, 2003). Although EMT raises interesting predictions of gender-specific biases in mate-selection, future investigations would benefit from greater ecological validity, particularly in terms of identifying how this theory manifests in actual mating scenarios.

Conclusion

This study demonstrated that mood-inducing environments affected people's perceptions of SI and CI and may have eliminated overestimation or underestimation biases in opposite-sex perceptions. Positive moods generally resulted in higher ratings of SI and CI, particularly in people who had just moved from a negative mood. Regardless of mood, both genders made intrasexually competitive judgments of same-sex rivals for qualities desired by the opposite-sex.

Although some premises of evolutionary theory, such as intrasexual competition, remain supported by the current findings, the predictions stemming from EMT do not explicitly explain how additional variables (such as mood) may modify, and perhaps overshadow, reproductively advantageous perceptions of potential mates. The results are also suggestive of culture-specific norms for self-evaluation and mate preferences which may influence intrasexually competitive judgments. As EMT gains acceptance as an explanatory model for perceptual biases, its instability within individuals and across environments must be recognised.

Acknowledgements: The authors would like to thank Professor Martie Haselton for generously providing the instruments used in her original study with Professor David Buss.

Received 08 December 2006; Revision submitted 04 July 2007; Accepted 16 July 2007

References

- Abbey, A. (1982). Sex differences in attributions for friendly behaviour: Do males misperceive females' friendliness? *Journal of Personality and Social Psychology*, *42*, 830-838.
- Bjorklund, D. F., and Shackelford, T. K. (1999). Differences in parental investment contribute to important differences in men and women. *Current Directions in Psychological Science*, *8*, 86-89.
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences*, *12*, 1-49.
- Buss, D. M. (1995a). Psychological sex differences: Origins through natural selection. *American Psychologist*, *50*, 164-168.
- Buss, D. M. (1995b). The future of evolutionary psychology. *Psychological Inquiry*, *61*, 81-87.
- Buss, D. M., and Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review*, *100*, 204-232.
- Clark, M. S., and Isen, A. M. (1982). Towards understanding the relationship between feeling states and social behavior. In A. H. Hastorf and A. M. Isen (Eds.), *Cognitive social psychology* (pp. 76-108). New York: Elsevier-North Holland.
- Cummins, R. A. (2003). Normative life satisfaction: Measurement issues and a homeostatic model. *Social Indicators Research*, *64*, 225-256.
- Davern, M. (2004). Subjective wellbeing as an affective construct. Unpublished Ph.D. thesis, Deakin University, Melbourne.
<http://www.deakin.edu.au/research/acqol/theses/index.htm>.
- Diener, E., and Diener, C. (1996). Most people are happy. *Psychological Science*, *7*, 181-185.
- Demaree, H. A., Schmeichel, B. J., Robinson, J. L., and Everhart, D. E. (2004). Behavioural, affective, and physiological effects of negative and positive emotional exaggeration. *Cognition and Emotion*, *18*, 1079-1097.
- DeSouza, E. R., Pierce, T., and Zanelli, J. C. (1992). Perceived sexual intent in the US and Brazil as a function of nature of encounter, subjects' nationality, and gender. *Journal of Sex Research*, *29*, 251-260.
- Einon, D. (1994). Are men more promiscuous than women? *Ethology and Sociobiology*, *15*, 131-143.
- Fisher, N.I. (1993). *Statistical analysis of circular data*. Cambridge: Cambridge University Press.
- Forgas, J. P. (1998). On being happy and mistaken: Mood effects on the fundamental attribution error. *Journal of Personality and Social Psychology*, *75*, 318-331.
- Friedrich, J. (1993). Primary error detection and minimization (PEDMIN) strategies in social cognition: A reinterpretation of confirmation bias phenomena. *Psychological Review*, *100*, 298-319.
- Gangestad, S. W., and Thornhill, R. (1997). The evolutionary psychology of extrapair sex: The role of fluctuating asymmetry. *Evolution and Human Behaviour*, *18*, 69-88.

- Grossman, J. B., and Kaufman, J. C. (2002). Evolutionary psychology: Promises and perils. In R. J. Sternberg and J. C. Kaufman (Eds.), *Evolution of intelligence* (pp. 9-25). Mahwah, NJ: Lawrence Erlbaum Associates.
- Haselton, M. G., and Buss, D. M. (2000). Error management theory: A new perspective on biases in cross-sex mind reading. *Journal of Personality and Social Psychology*, *78*, 81-91.
- Haselton, M. G., and Nettle, D. (2006). The paranoid optimist: An integrative evolutionary model of cognitive biases. *Personality and Social Psychology Review*, *10*, 47-66.
- Koukounas, E., and Letch, N. M. (2001). Psychological correlates of perception of sexual intent in women. *Journal of Social Psychology*, *141*, 443-456.
- Le, B., and Agnew, C. R. (2003). Commitment and its theorized determinants: A meta-analysis of the investment model. *Personal Relationships*, *10*, 37-57.
- May, J. L., and Hamilton, P. A. (1980). Effects of musically evoked affect on women's interpersonal attraction and perceptual judgements of physical attractiveness of men. *Motivation and Emotion*, *4*, 217-228.
- Park, J., and Banaji, M. R. (2000). Mood and heuristics: The influence of happy and sad states on sensitivity and bias in stereotyping. *Journal of Personality and Social Psychology*, *78*, 1005-1023.
- Rusbult, C. E. (1980). Commitment and satisfaction in romantic associations: A test of the investment model. *Journal of Experimental Social Psychology*, *16*, 172-186.
- Rusbult, C. E., Martz, J. M., and Agnew, C. R. (1998). The investment model scale: Measuring commitment level, satisfaction level, quality of alternatives, and investment size. *Personal Relationships*, *5*, 357-391.
- Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, *110*, 145-172.
- Toro-Morn, M., and Sprecher, S. (2003). A cross-cultural comparison of mate preferences among university students; the United States vs. The People's Republic of China. *Journal of Comparative Family Studies*, *34*, 151-170.
- Wilson, M., and Daly, M. (1997). Relationship-specific social psychological adaptations. In G. R. Bock and G. Cardew (Eds.), *Characterizing human psychological adaptations* (pp. 253-268). West Sussex: John Wiley and Sons Ltd.