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# A TEST OF THE EVOLUTIONARY EXPLANATION OF JEALOUSY IN THE UNITED STATES AND CROATIA

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Numerous investigators reported results which support the evolutionary theory of sex differences in jealousy. In this study we extend the cross cultural evaluation of jealousy to a comparison between U.S. and Croatian populations. Two alternative forced choice methods were used to assess how upset males and females were in the sexual or emotional infidelity of their mate with either a same sex person (homosexual relationship) or an opposite sex person (heterosexual relationship). A checklist of emotions was also given to the subjects to assess in more detail their feelings about the infidelities. In both the US and Croatia females showed a strong tendency to be upset by the emotional infidelity in the heterosexual case, but a complete reversal to the sexual infidelity in the homosexual case. Males were more upset by the sexual infidelity than females in the heterosexual case, but less upset by the sexual infidelity than the females in the homosexual case. Self reported emotions revealed anger, disgust and sadness to differentiate the feelings of the subjects to the different situations. The Croatian participants reported significantly more emotions than the US participants. The general predictions of the evolutionary account of sex differences in what caused the most distress were supported.

Keywords: jealousy, evolutionary psychology, sex differences, cross-cultural evaluation

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Buss et al. (1992) were the first to present data to support an evolved sex difference in what causes jealousy. The argument is that males will be more upset than females by a sexual infidelity because it is a threat to their certainty of paternity. Females will be more upset than males by an emotional infidelity because in the environment of evolutionary adaptedness, females needed the help of their male partner to successfully raise their child and his emotional attachment to another female would threaten his continuing willingness to help raise the children. Results in support of the evolutionary based sex differences in what causes the greatest likelihood of being upset, which is interpreted as representing different degrees of jealousy, have been reported by numerous investigators using a variety of methods including the forced choice method originally reported by Buss et al. (1992) and continuous measures of jealousy, as well as physiological responses (e.g., Pietrzak et al., 2002; Sagarin et al., 2003).

Support for an evolved mechanism can be produced by finding similar behavioral results across cultures. The sex differences in jealousy have been found in various countries including the United States, Germany, The Netherlands, Korea and Japan (Buunk et al., 1996; Buss et al., 1999). In this study we extend the cross cultural evaluation of jealousy to a comparison between U.S. and Croatian populations.

In order to provide a further test of the evolutionary theory of jealousy, we asked our cross cultural samples of men and women how upset they felt about their partner having a same sex (homosexual) sexual versus emotional relationship. Sagarin et al. (2003) used a similar manipulation, and hypothesized that there would be no difference between men and women in what caused jealousy, and that the overall level of jealousy would be lower for the same sex infidelity compared to a heterosexual infidelity. They found support for their hypothesis, but we felt that the issue should be further evaluated. It is true that for males their female mate having a same sex sexual relationship does not pose a threat of paternity uncertainty per se and therefore the degree to which it should give rise to feelings of jealousy should be less than the heterosexual sexual relationship. On the other hand, according to the evolutionary account of female jealousy she would be upset by anything that threatens to reduce or eliminate support in raising children by her mate. Perhaps one of the most salient differences between men and women is the much stronger desire for males to have sex sooner in a relationship, with more frequent sex than for females (e.g. Buss, 2008). If the male mate has a homosexual relationship it may signal a serious problem for the female in that she no longer is her mates' primary sexual partner – he prefers another male. If she does not satisfy his sexual desires, he may not maintain a high level of

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commitment to her, and so his homosexual sexual infidelity might be seen as a warning sign of trouble in the relationship. Therefore we asked our subjects what made them more upset, an emotional or sexual infidelity when it occurred within the context of a heterosexual relationship or a homosexual relationship. We hypothesized that the usual sex difference would occur in the heterosexual case (with men being more upset by sexual infidelity than women), but in the homosexual case women would be more upset with the sexual infidelity than men.

In addition we had our subjects circle emotions (e.g., anger, disgust, sadness, surprise, interest and jealousy) that they felt applied to them in order to get a more detailed assessment of the nature of the reaction elicited by the different scenarios. Jealousy is not a "basic" emotion in most theories of emotion unlike anger, disgust, etc. (Cartwright, 2008). We felt that the emotions attached to the different infidelity situations might provide a more detailed characterization of the reaction to the infidelity, than simply indicating which was more upsetting. The emotions underlying what is most upsetting should provide a more detailed assessment of why the particular scenario is upsetting.

## METHODS

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### Participants

A total of 233 students, 119 males and 114 females, at the University of Texas at Arlington, earned course credit for filling out the questionnaire. A total of 195 students (mean age 19.8,  $SD=2.42$ ), 90 males and 105 females, at the University of Zagreb in Croatia, volunteered to fill out the questionnaire.

### Questionnaire

A sheet of paper was given to each participant with a place to circle their gender: male or female. The statement, "Assume in the situations below that there is no danger of sexually transmitted diseases occurring because of the relationship" was printed in bold face font, followed by the scenario: "Please think of a committed romantic relationship that you have had in the past, that you have now, or that you would like to have. Imagine that you discover that the person with whom you have been seriously involved becomes interested in someone else. What would upset or distress you more? (Please circle only one.) (A) Discovering that your partner is having deep passionate sexual relationship with that other person. (B) Discovering that your partner is forming a deep emotional attachment by confiding and sharing confidences with that other person." On the next line was the statement, "Circle the following word(s) that best describe your feelings about the situation you circled." Then the following emotions were listed on one line with several spaces between them: "Anger Dis-

gust Interest Jealousy Surprise Sadness None of these". We chose these emotions so that they were not all negative (interest and surprise) and we wanted to keep the list as short as possible in order to get a "first impression". We felt a longer list or using a Likert scale for each of the emotions would bring too much possible cognitive functioning into play, and we were interested in the "raw" emotion the different scenarios elicited. There was then a horizontal line followed by the second scenario. "Assume the same situation as above, but now the person who your partner is involved with is the same sex as your partner. What would upset or distress you more? (Again, circle only one.) (A) Discovering that your partner is having a passionate sexual relationship with the other person. (B) Discovering that your partner is forming a deep emotional attachment by confiding and sharing confidences with that other person." The same statement and list of emotional words as in the first scenario was presented below. The questionnaire was translated into Croatian for use in that country.

## RESULTS

Because we performed multiple Chi square tests we decided to set the criterion for significance at 0.01 rather than the conventional 0.05 to protect against type 1 errors. We also analyzed the total number of emotions circled by each subject using an analysis of variance with scenario as a repeated factor (homosexual vs. heterosexual) and gender and country as between subject factors.

### Heterosexual Infidelity

The percentage of participants who circled the sexual or emotional infidelity as the most distressing option is shown in Table 1 for males and females from the US or Croatia answering the heterosexual or homosexual scenario. The data for the heterosexual scenario are in agreement with a large body of literature using this methodology showing that males are more often distressed by the sexual infidelity than females who are more often distressed by the emotional infidelity. A chi square test for Croatian males and females was significant,  $\chi^2(1) = 27.50$ , as it was for US participants,  $\chi^2(1) = 33.90$ . The male US participants were more often distressed by the sexual infidelity than their Croatian male counterparts,  $\chi^2(1) = 11.02$ , and the female Croatian participants were more often distressed by the emotional infidelity than their US female counterparts,  $\chi^2(1) = 10.81$ .

➔ TABLE 1  
Percent upset by  
sexual infidelity

		Male	Female
Heterosexual	Croatia	48.9	14.3
	US	71.4	33.3
Homosexual	Croatia	51.1	67.9
	US	49.6	86.0

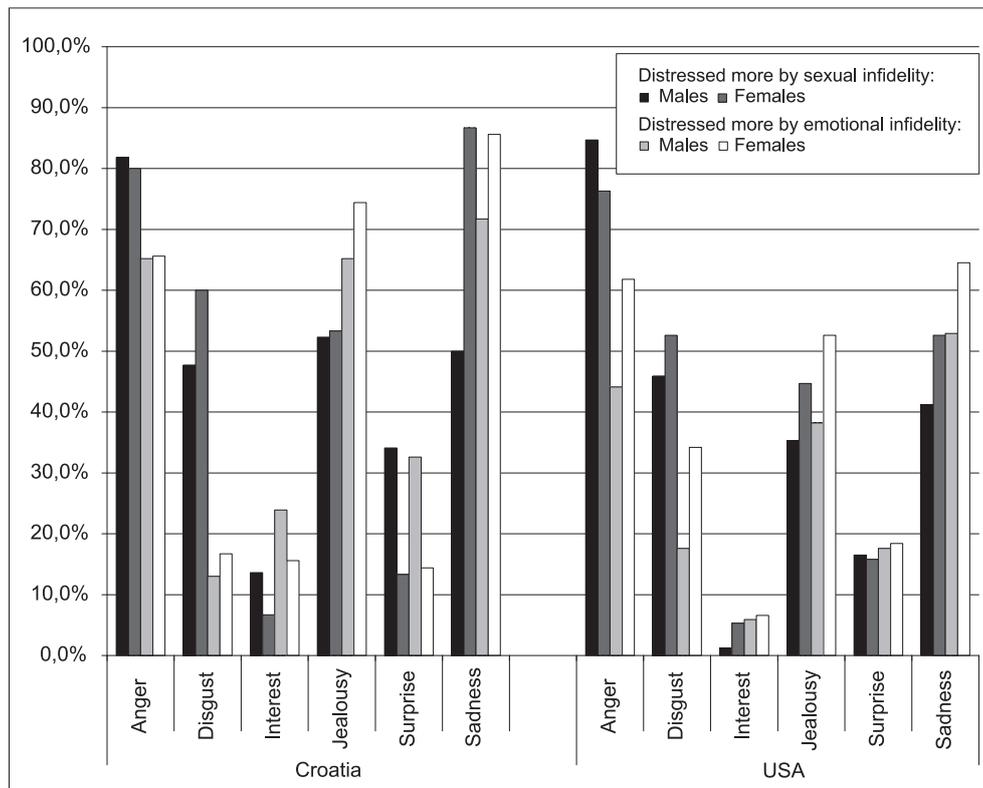
## Homosexual Infidelity

The homosexual infidelity scenario shows a very different pattern of what is most probable to be upsetting, particularly for the female participants in both countries. The majority of females in both countries were more upset by the homosexual sexual infidelity unlike the heterosexual scenario,  $\chi^2(1) = 52.27$ , for Croatia,  $\chi^2(1) = 65.60$ , for the US. A comparison of females from each country on the homosexual infidelity scenario showed that US females were more often upset by the sexual infidelity than the Croatian participants,  $\chi^2(1) = 15.52$ . For males, the Croatian participants remained at about 50% for both the heterosexual and homosexual sexual infidelity,  $\chi^2(1) = 0.09$ , but US males were more frequently upset by the heterosexual sexual infidelity than the homosexual one,  $\chi^2(1) = 11.89$ . A comparison of males from each country on the homosexual infidelity scenario showed that among US and Croatian males, equal percentages were upset by the homosexual sexual infidelity,  $\chi^2(1) = 0.05$ .

## Emotions

FIGURE 1  
Emotions in  
heterosexual scenario

The percentage of male and female participants from Croatia and the US who circled one of the 6 emotions as a function of the scenario for infidelity and which infidelity was most upsetting to them is shown in Figures 1 and 2.



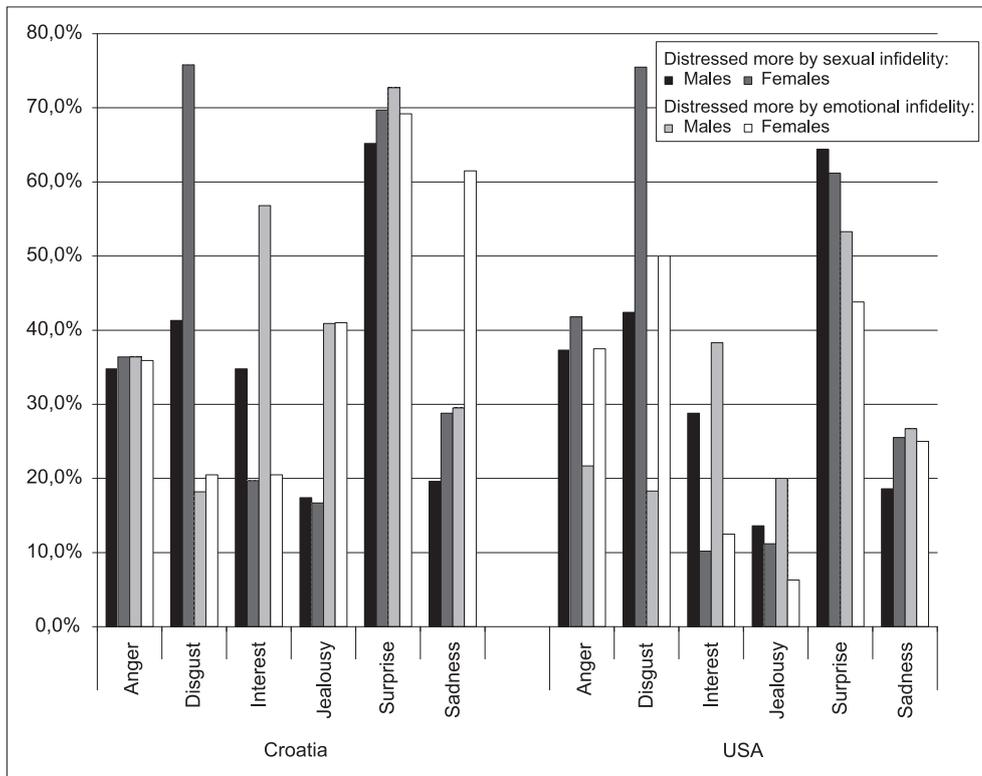


FIGURE 2  
Emotions in  
homosexual scenario

### Anger

Those participants who were most upset by the heterosexual sexual infidelity were most likely to be angry, but when it was a homosexual infidelity, the percentage expressing anger was less than half of the heterosexual case. All Chi square tests for anger in the homosexual versus heterosexual scenarios among those most upset with the sexual infidelity were significant (US males,  $\chi^2(1) = 35.49$ , US females,  $\chi^2(1) = 13.03$ , Croatian males,  $\chi^2(1) = 20.96$ , and Croatian females,  $\chi^2(1) = 9.43$ ). In the heterosexual scenario, for those most upset by the emotional infidelity, anger was still a fairly frequent emotion, but less frequent than the anger for those most upset by the sexual infidelity, but the only significant difference was for US males ( $\chi^2(1) = 20.35$ ). There were no significant differences in anger between the sexually upset versus emotionally upset participants in the homosexual scenario. Those most upset by the emotional infidelity were not often angry when it was a homosexual scenario, and this was particularly so for the males from both countries (US males,  $\chi^2(1) = 5.23$ , Croatian males,  $\chi^2(1) = 7.49$ ). Only the Croatian females were less frequently angry with the homosexual emotional infidelity ( $\chi^2(1) = 9.74$ ), and the US females showed the same pattern, but it was not a statistically significant difference ( $\chi^2(1) = 3.21$ ).

### **Disgust**

Those participants that were most upset by the heterosexual sexual infidelity were more likely to express disgust than those who were upset by the emotional infidelity, and this was consistent for both males and females in the US and Croatia, with only the US females showing a non-statistically significant difference ( $\chi^2(1) = 3.57$ ). The most interesting pattern for disgust was the larger percentage of females who expressed disgust for the homosexual sexual infidelity as compared to the heterosexual one in both countries (75%), although only the US females showed a significant difference ( $\chi^2(1) = 6.72$ ). As noted above, males in both countries indicated more disgust with the sexual infidelity than the emotional one, but there was no difference between the heterosexual and homosexual scenarios.

### **Interest**

For the heterosexual infidelity scenario, few participants expressed interest as an emotion, although the Croatian males and females did show some "interest" for the participants most upset by the emotional infidelity. Males showed a higher percentage of "interest" for the homosexual infidelity scenario than the heterosexual one when upset by the sexual infidelity (US,  $\chi^2(1) = 24.32$ , Croatia,  $\chi^2(1) = 5.45$ ) or emotional infidelity (US,  $\chi^2(1) = 11.71$ , Croatia,  $\chi^2(1) = 10.15$ ).

### **Surprise**

Male Croatians were somewhat more frequently surprised by the heterosexual infidelity scenario as compared to their female counterparts, although the percentage indicating surprise was still relatively low (33%) and the difference failed to reach statistical significance. Males and females from Croatia and the US all showed relatively high frequencies of surprise for the homosexual infidelity scenario as compared to the heterosexual infidelity scenario (all  $\chi^2$ 's significant except US females most upset by the emotional infidelity,  $\chi^2(1) = 4.81$ ).

### **Sadness**

The female Croatian participants reported sadness for the heterosexual infidelity as their dominant emotion (85%). The Croatian females were significantly more sad than Croatian males when the infidelity that upset them most was the sexual one ( $\chi^2(1) = 6.23$ ), but not when it was the emotional infidelity that upset them the most ( $\chi^2(1) = 3.76$ ). "Sadness" was much less frequently expressed for the homosexual infidelity than the heterosexual one, with all  $\chi^2$ 's significant between each of the pairs within each gender – country – most upsetting act combinations in Figures 1 and 2.

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### Jealousy

Both male and female Croatians expressed more jealousy than the corresponding US participants regardless of which infidelity was most upsetting in the heterosexual case. Jealousy was much lower for the homosexual scenario as compared to the heterosexual one for both infidelities and both countries. Jealousy was infrequently used as a description of their emotional reaction to the homosexual scenario, with the exception of Croatian males and females upset by the emotional infidelity.

### Total Number of Emotions

The total number of emotions circled was subjected to an ANOVA with gender and country as between subject factors and type of scenario as a repeated factor. Which infidelity was most upsetting was ignored for this analysis. The Croatian participants circled significantly more emotions (2.12) than the US participants (1.87),  $F(1,424) = 7.79, p = 0.005$ . There was also a significant interaction of the type of scenario and gender where the number circled was about the same for the heterosexual scenario ( $m = 1.96$  and  $1.98$  for males and females, respectively), while the males showed a slight decrease in the number circled for the homosexual scenario ( $m = 1.90$ ), but the females showed an increase ( $m = 2.15$ ),  $F(1,424) = 6.09, p = 0.014$ . No other factors or interactions were significant.

### Co-Occurrence of Emotions

TABLE 2  
 The probabilities of one emotion given another emotion was circled

We have also explored the co-occurrences of emotions for each scenario, gender and culture separately. The probabilities of one emotion given another emotion was circled are shown in Table 2, and commented in the discussion section.

	Croatia (%)				USA (%)			
	Hetero Sexual	Emotional	Homo Sexual	Emotional	Hetero Sexual	Emotional	Homo Sexual	Emotional
Male								
Disgust / Anger	47	13	63	31	47	20	50	38
Interest / Anger	11	23	13	44	1	0	18	15
Jealousy / Anger	58	73	25	56	40	53	27	38
Sadness / Anger	53	67	31	56	42	67	23	46
Surprise / Anger	31	40	63	75	17	27	59	54
Anger / Disgust	81	67	53	63	87	50	44	45
Interest / Disgust	14	0	16	25	3	0	16	9
Jealousy / Disgust	52	50	11	25	49	50	12	27
Sadness / Disgust	62	67	26	25	46	33	20	45
Surprise / Disgust	43	50	58	63	23	33	52	45
Anger / Interest	67	64	13	28	100	0	24	9
Disgust / Interest	50	0	19	8	100	0	24	4
Jealousy / Interest	17	73	25	44	100	0	18	9
Sadness / Interest	50	64	25	24	100	0	18	4
Surprise / Interest	67	45	81	76	100	0	88	61

continued

⊙ continued	Croatia (%)				USA (%)			
	Hetero Sexual	Emotional	Homo Sexual	Emotional	Hetero Sexual	Emotional	Homo Sexual	Emotional
Anger / Jealousy	91	73	50	50	97	62	75	42
Disgust / Jealousy	48	10	25	11	63	23	38	25
Interest / Jealousy	4	27	50	61	3	0	38	17
Sadness / Jealousy	57	77	50	50	50	69	38	50
Surprise / Jealousy	30	40	50	83	27	23	63	58
Anger / Sadness	86	61	56	69	86	56	45	38
Disgust / Sadness	59	12	56	15	51	11	45	31
Interest / Sadness	14	21	44	46	3	0	27	6
Jealousy / Sadness	59	70	44	69	43	50	27	38
Surprise / Sadness	36	33	78	77	23	28	82	38
Anger / Surprise	73	80	33	38	86	67	34	22
Disgust / Surprise	60	20	37	16	64	33	34	16
Interest / Surprise	27	33	43	59	7	0	39	44
Jealousy / Surprise	47	80	13	47	57	50	13	22
Sadness / Surprise	53	73	23	31	57	83	24	19
Female								
Disgust / Anger	58	20	83	43	52	43	76	17
Interest / Anger	8	12	8	29	7	6	12	17
Jealousy / Anger	67	81	25	50	52	57	20	17
Sadness / Anger	83	81	38	71	62	66	37	17
Surprise / Anger	17	17	58	50	17	23	63	33
Anger / Disgust	78	80	40	75	75	77	42	13
Interest / Disgust	11	20	16	25	5	12	11	13
Jealousy / Disgust	44	47	16	38	35	54	11	13
Sadness / Disgust	89	80	32	38	70	73	24	25
Surprise / Disgust	11	20	66	63	20	31	61	50
Anger / Interest	100	50	15	50	100	60	50	50
Disgust / Interest	100	21	62	25	50	60	80	50
Jealousy / Interest	0	86	15	50	100	40	0	0
Sadness / Interest	100	93	8	50	50	80	30	0
Surprise / Interest	0	7	92	63	50	40	90	100
Anger / Jealousy	100	72	55	44	88	68	73	100
Disgust / Jealousy	50	10	73	19	41	35	73	100
Interest / Jealousy	0	18	18	25	12	5	0	0
Sadness / Jealousy	75	88	55	69	53	70	45	100
Surprise / Jealousy	25	15	64	69	18	28	55	100
Anger / Sadness	77	62	47	42	90	63	60	25
Disgust / Sadness	62	16	84	13	70	39	72	50
Interest / Sadness	8	17	5	17	5	8	12	0
Jealousy / Sadness	46	77	32	46	45	57	20	25
Surprise / Sadness	8	13	58	67	30	22	72	50
Anger / Surprise	100	77	30	26	83	79	43	29
Disgust / Surprise	50	23	72	19	67	57	75	57
Interest / Surprise	0	8	26	19	17	14	15	29
Jealousy / Surprise	100	77	15	41	50	79	10	14
Sadness / Surprise	50	77	24	59	100	79	30	29

## DISCUSSION

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The evolutionary theory of sex differences in jealousy to sexual versus emotional infidelity was supported. In both the US and Croatian samples, males were more frequently distressed by the sexual heterosexual infidelity than females and females were more frequently distressed by the emotional heterosexual infidelity than males. Since the reason for the evolutionary theory prediction that males are upset by a heterosexual infidelity on the part of their female partner is based on the possibility of their mate being pregnant with another male's child (paternity uncertainty), we predicted that males would be less disturbed by their female mate having a same sex sexual relationship than the heterosexual sexual relationship since there is no risk of pregnancy (no paternity uncertainty) from the same sex relationship. This proved to be true for the US males, where 71.4% were most upset by the heterosexual sexual infidelity, but only 49.6% were most upset by the homosexual sexual infidelity. The Croatian males, on the other hand, were about equally split between the sexual and emotional infidelities in both the homosexual and heterosexual infidelity scenarios. However, the reported emotions to the two scenarios show a clear pattern in support of the evolutionary prediction. Anger, the dominant emotion expressed by the male Croatians to the heterosexual sexual infidelity (81.8%), was dramatically decreased in the homosexual sexual infidelity (34.8%), and sadness was also less likely to be expressed for the homosexual sexual infidelity (19.6%) than the heterosexual one (50.0%). A similar pattern of expressed emotions was evident for the US males and supports the hypothesis that a same sex sexual relationship for a male's female partner is much less threatening than an opposite sex one where paternity uncertainty is the evolutionary motivating force.

The evolutionary theory of jealousy for females is based on the idea that in order to successfully raise children she would need the support of her male partner, and if he were to form a deep emotional bond with another female his support would be in doubt. Consistent with this reasoning, females in the US and Croatia were more frequently upset with their mate forming such a bond with another female than having sex with another female (66.7 and 85.7%, respectively). However, when the sexual or emotional infidelity was with a same sex person the female participants were much more upset by their male's homosexual sexual infidelity in both the US (86.0%) and Croatia (67.9%). In pilot work we had observed this effect, and were concerned that it might be related to the possibility of a sexually transmitted disease be-

ing contracted by a homosexual relationship, and this might mediate the females being upset with that particular possibility. For this reason we included a statement on the questionnaire, in bold face type, that there was no danger of a sexually transmitted disease being contracted though the sexual infidelity. Assuming that the threat of sexually transmitted disease is not a factor, we ask why, from an evolutionary viewpoint, would females be upset with their male mate entering into a sexual homosexual relationship? One fact of human sexuality is that males are more ready to have sex than females under a variety of conditions (Buss, 2008). One way that a wife, or committed female partner, can insure the continued support of her male mate is through the fact that sexual intimacy is an assumed, and condoned, part of the relationship. If her male partner were to prefer a sexual relationship with another male this may signal a very serious problem for the female for the continuation of the relationship because it indicates a permanent lack of interest in the female partner. Presumably, the female no longer provides the source of sexual satisfaction that males are highly motivated to seek.

Females in both countries were predominantly angry and sad over their male partner's heterosexual sexual infidelity, but they were predominantly disgusted and to a lesser extent, surprised, by the homosexual sexual infidelity, suggesting two very different reactions to the type of sexual infidelity. Moreover according to some theories female's sexual behavior is more plastic than male's and therefore an incident of male homosexual behavior represents a more serious long term orientation than does a female's incident of homosexuality (Baumeister, 2000).

The fact that participants found the homosexual infidelity surprising (~70%), but did not report jealousy as a predominant emotion (6.3% to 41%), suggests that perhaps the homosexual infidelity scenarios require further analysis. Indeed the fact that jealousy was not the most predominant emotion in the heterosexual infidelity scenarios (35.3% to 74.4%), suggests that this also should be subject to further analysis. A major disconnect exists between the evolutionary theory of jealousy and its empirical tests. Like all previous research using the forced choice sexual versus emotional infidelity methodology, the scenarios we used describe an infidelity that has already occurred, but the theory hypothesizes that the threat of the infidelity is what is supposed to trigger jealousy which then motivates several possible behaviors to prevent the sexual or emotional infidelity from happening (e.g., Buss, 2004, p. 331). So the fact that the scenarios specify infidelities that have already occurred makes jealousy less relevant and makes more

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basic emotions such as anger, disgust and sadness more appropriate than jealousy. Thus when participants are asked, "What would upset or distress you more?" they are reflecting on the anger, disgust, sadness, etc. generated by the scenario, not jealousy.

It is doubtful that ancestral males would have changed from a heterosexual to a homosexual orientation with sufficient frequency to make it a recurring problem in our evolutionary past, and therefore not the basis of an evolved mechanism. The general loss of commitment by a male to his mated female presumably did occur with sufficient frequency to serve as the basis of an evolved response. We propose that the homosexual orientation of the male mate is one instance of a situation that represents this more general loss of commitment, and is therefore relevant to the evolution of female reactions to the loss.

Although the main patterns of results are similar between the two countries, there are some differences worth noting. For both male and female Croatians, the heterosexual emotional infidelity was more upsetting than it was for US participants. This difference may reflect a long term cultural difference. European participants in some other studies showed a comparable cultural difference: for example, Buunk et al. (1996) showed that 52% of Dutch males would be most upset with the sexual infidelity (compared to 49% of the Croatian males) and 15% of the German females would be most upset with the sexual infidelity (compared to 14% of the Croatian females). The magnitude of the sex difference in the abovementioned study was large for the US sample, medium for the Dutch sample and small for the German sample (sexes in the German sample differed by only 12% in responses to which infidelity scenario was more distressing). Authors have argued that this might be due to a long history of sexual freedoms in Germany and the Netherlands, since both cultures share a set of very relaxed attitudes toward sexuality, including extramarital sex. However, in a more recent study, Brase et al. (2004) showed an even smaller magnitude of sex difference in Romania, where 36.6% of men compared to 30.0% of women reported being more upset by the sexual infidelity: one could hardly argue that Romanian culture emphasizes sexual equality. In fact, these authors point out that Romanian culture considers motherhood as a woman's primary vocation, and parenthood in general as an essential activity. In their opinion, this results in a strong cultural pressure for having children and maintaining relationships, making the prospect of emotional infidelity more upsetting for both sexes. Thus, a similar pattern of sex differences is explained in two very different ways in these two studies. Given its historical, cultural and religious back-

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ground, Croatia is certainly closer to Germany than to Romania; however, being a transitional country, undergoing huge socio-economic and demographic changes in the last couple of decades, it shares some similarities with Romania in that respect. Nevertheless, neither of these two sets of explanations seems comprehensive enough: attitudes toward sexuality and family life could probably account for some proportion of variance in patterns of jealousy found in cross-cultural data, but research into cultural variations in emotions showed that those variations can also originate from, among other reasons, differences in appraisal processes (e.g. Mesquita & Frijda, 1992). Thus, different behaviors and types of infidelities might be appraised differently across cultures: a study conducted in seven nations, aimed to investigate what elicits sexual jealousy, showed that Yugoslavs<sup>1</sup> were among the most jealous responding cultures when some behaviors were in question, but had relatively neutral responses when other behaviors were concerned (Buunk & Hupka, 1987). Specifically, flirting evoked most negative emotional response in that sample compared to any other country, while kissing and sexual fantasies evoked a neutral response. Obviously, further investigation into the effect of cultural norms and attitudes, as well as the perception of certain behaviors on the size of sex differences in jealousy is needed.

Another difference between the countries was the more frequent use of the emotion "sadness" by the Croatian participants, particularly the females. This may also reflect a cultural difference, with the US being a more individualistic culture, compared to a more collectivistic culture in Croatia (Eid & Diener, 2001). Thus, there might be a more strict set of rules about expressing sadness in the US than in Croatia. In general, the total number of emotions circled was greater for the Croatian participants than those from the US, a result consistent with this notion. It has been shown that cultures differ in respect to the standards of social desirability of certain emotions, as well as differential inhibitory regulation of emotional repertoires (Mesquita & Frijda, 1992). When it comes to attitudes towards jealousy in romantic relationships, it has been shown that US college students perceive it as less favorable than a comparable group of French students (Simmons et al., 1989), which might make them less inclined to admit to experiencing it.

Furthermore, the inspection of Table 2 reveals another set of slight cultural variations in co-occurrence of certain emotions. For example, although high co-occurrence of jealousy and anger in the heterosexual scenario can be found in both American and Croatian males, Croatians also showed a high co-occurrence of sadness with jealousy, especially the ones

<sup>1</sup> The sample was labeled as Yugoslav, since the study was conducted while Croatia was a part of ex-Yugoslavia; however, the data were collected in Croatia by prof. A. Fulgosi.

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that reported emotional infidelity as being more upsetting. Similarly, there was a greater co-occurrence of anger and sadness in Croatian compared to American women, irrespectively of the infidelity scenario. However, in many respects, the pattern of co-occurrences showed greater similarities than differences between samples, especially in women: for example, the majority of the ones that circled disgust also circled anger and sadness, while the interest co-occurred with anger, jealousy and surprise. Similarly, surprise often co-occurred with anger and sadness in male samples, irrespectively of culture. Based on this similarity in patterns of circled emotions, it could be suggested that sexual jealousy, even though it is not considered a primary emotion *per se*, occurs as a cluster of a culturally universal set of emotions.

A previous report suggested, "...the complete disappearance of the sex difference when an infidelity involves a same-sex lover." (Sagarin et al., 2003, p. 21). However, that conclusion misses some important points. In fact, their data show that 16% of females were most upset by the sexual infidelity in the heterosexual scenario, while 37% were most upset by the sexual infidelity when it was a homosexual scenario. Since the raw data were presented in the article we did a Chi square test and found the difference to be significant ( $\chi^2(1) = 14.91, p < 0.01$ ). Similarly, the males in the Sagarin et al. study were more likely to be upset by the sexual infidelity when it was a heterosexual scenario (51%), than when it was a homosexual scenario (33%), the difference again being significant ( $\chi^2(1) = 6.60, p < 0.01$ ). The differences between homo- and hetero-sexual infidelities are in the same direction as we report in this study, although the absolute percentages are different, and the difference between heterosexual and homosexual infidelities for females is much smaller in their data, compared to ours. Their questions were embedded in a much larger survey involving pretesting introductory psychology students in their classroom, while our questionnaire was done individually, although other tasks were done in the same time block for the US participants. In addition, they used a between subject design (only the heterosexual or homosexual scenario was given to each participant), while we used a within subject design where both scenarios were presented to each subject. The within subject design may have made the homosexual scenario more salient to our participants, thereby increasing the magnitude of the effect. These differences in the administration of the questions may account for some of the differences in results.

In conclusion, the general predictions of the evolutionary account of sex differences between males and females in

what caused the most distress or was most upsetting were supported. With the homosexual infidelities a different pattern of what was most upsetting emerged, and the emotions reported toward the infidelities were also consistent with an evolutionary explanation. The emotional reactions of the participants to the various scenarios and which of them were most upsetting adds new perspectives on the different reactions of males and females to sexual and emotional infidelities.

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## Provjera evolucijskog objašnjenja ljubomore na hrvatskom i američkom uzorku

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Rezultati mnogih istraživanja idu u prilog evolucijskim objašnjenjima spolnih razlika u ljubomori. U ovom smo istraživanju te nalaze proširili međukulturnom usporedbom na hrvatskom i američkom uzorku. Upotrijebljena su dva zadatka prisilnog izbora kako bi se procijenio stupanj uznemirenosti kod muškaraca i žena u slučaju seksualne ili emocionalne nevjere njihova partnera/partnerice, ovisno o tome je li se nevjera dogodila s osobom istoga spola (homoseksualna veza) ili osobom suprotnoga spola (heteroseksualna veza). Kako bismo prikupili detaljnije informacije o osjećajima vezanima uz preljub, ponuđena je i lista emocija. Žene u obje kulture pokazale su veću uznemirenost u slučaju emocionalne nevjere u heteroseksualnom scenariju, ali potpuno suprotan obrazac u homoseksualnom scenariju (tj. veću uznemirenost u slučaju seksualne nevjere). Muškarci su u usporedbi sa ženama pokazali veću uznemirenost u slučaju seksualnoga preljuba u heteroseksualnom scenariju, ali manju uznemirenost u homoseksualnom scenariju. Osjećaji ljutnje, gađenja i tuge različito su se javljali u ove dvije situacije. Hrvatski su sudionici općenito izvještavali o većem broju emocija nego američki. Potvrđena su opća predviđanja evolucijske hipoteze o podrijetlu spolnih razlika u ljubomori.

Ključne riječi: ljubomora, evolucijska psihologija, spolne razlike, međukulturna usporedba

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## Eine Überprüfung der evolutionspsychologischen Erklärung von Eifersucht am Beispiel kroatischer und US-amerikanischer Probanden

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Die Ergebnisse zahlreicher Forschungen verweisen auf die Richtigkeit der Annahme, dass die unterschiedlichen Manifestationen der Eifersucht bei Frauen und Männern entwicklungs geschichtlich bedingt sind. Die Autoren haben diese Erkenntnis durch einen interkulturellen Vergleich erweitert und das Phänomen der Eifersucht unter Kroaten und US-Amerikanern untersucht. Die Probanden wurden vor zwei Aufgaben gestellt, bei denen sie sich für eine von mehreren angebotenen Lösungen zu entscheiden hatten. Die Forscher wollten ermitteln, inwiefern die Frauen und Männer mit Verstörung auf den angenommenen Fall der sexuellen oder emotionalen Untreue ihrer PartnerInnen reagierten; dabei unterschieden die Befragten zwischen Seitensprüngen mit homosexuellen und Seitensprüngen mit heterosexuellen Partnern. Um detaillierte Informationen zu den Gefühlen des betrogenen Partners zu erhalten, wurde eine Checkliste von Emotionen angeboten. Die Probandinnen beider Kulturkreise bekundeten eine stärkere Verstörung für den Fall, dass ihr Partner bei einem heterosexuellen Seitensprung emotionale Untreue manifestierte; ebenso verstörend fänden sie die körperliche Untreue ihres Partners bei einem homosexuellen Seitensprung. Männer hingegen äußerten eine stärkere Verstimmung, sollte ihre Partnerin ihnen bei einem heterosexuellen Seitensprung untreu werden; weniger beunruhigend fänden sie den Fall homosexueller Untreue. Die Gefühle von Wut, Ekel und Traurigkeit zeigten je nach Szenario einen unterschiedlichen Ausschlag. Insgesamt kann gesagt werden, dass die kroatischen Untersuchungsteilnehmer eine größere Bandbreite an Emotionen an den Tag legten als die amerikanischen. Die allgemeine evolutionspsychologische Hypothese, dass sich Eifersucht bei Frauen und Männern unterschiedlich manifestiert, konnte bestätigt werden.

Schlüsselbegriffe: Eifersucht, Evolutionspsychologie, geschlechtsbedingte Unterschiede, interkultureller Vergleich