The Economics of Faking Ecstasy

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Abstract

In this paper, we develop a signaling model of rational lovemaking. In the act of lovemaking, a man and a woman send each other possibly deceptive signals about their true state of ecstasy. For example, if one of the partners is not in ecstasy, then he or she may decide to fake it. The model predicts that (1) a higher cost of faking lowers the probability of faking; (2) middle-aged and old men are more likely to fake than young men; (3) young and old women are more likely to fake than middle-aged women; and (4) love, formally defined as a mixture of altruism and demand for togetherness, increases the likelihood of faking. The predictions are tested with data from the 2000 Orgasm Survey. Besides supporting the model's predictions, the data also reveal an interesting positive relationship between education and the tendency to fake in both men and women. (JEL D82 J16)

1. Introduction

In the movie "When Harry Met Sally" (Columbia Pictures, 1989), there is a scene in Katz's deli in New York that provides an interesting example of rational expectations equilibrium:

> Sally: Most women at one time or another have faked it.
>
> Harry: Well, they haven't faked it with me.
>
> Sally: How do you know?
>
> Harry: Because I know.
>
> Sally: Oh. Right. That's right. I forgot. You're a man.
>
> Harry: What was that supposed to mean?
>
> Sally: Nothing. It's just that all men are sure it never happened to them and all women at one time or other have done it, so you do the math.

If all women have faked it, then not all men can be rationally confident it has not happened to them. Therefore, this situation, in which all women have done it and all men are sure it has never happened to them, is not a rational expectations equilibrium.

So how can we explain this? Akerlof and Dickens's (1982) paper on cognitive dissonance suggests a behavioral rather than a rational explanation. The paper introduces the possibility of belief-dependent preferences. Accordingly, perhaps men simply derive utility directly from believing that their partner is not faking with them because this allows them to maintain a positive image of themselves. In this case, we can get a situation in which all women have done it and yet all men still believe it has never happened to them. However, any man with this kind of behavioral bias will likely be mistaken. One might instead dispute the claim that all men are confident it has never happened to them and thus do not have rational expectations.

In this paper, we develop a rational expectations signaling model of lovemaking that yields clear predictions about faking behavior, which we then test using actual survey data. In the model, a man and a woman who are making love send each other possibly deceptive signals about their true state of ecstasy. For example, if one of the partners is not in ecstasy, then he or she may decide to fake it.

We allow for the possibility that men can fake it too. Although men may not be able to fake ejaculation, they may nevertheless be able to fake orgasm. Ejaculation is the propulsion of seminal fluid, while orgasm is the peak feeling during sex. In *Love and Orgasm*, psychiatrist Alexander Lowen, based on his clinical observations, concludes that "...in terms of full satisfaction, the male suffers from orgasmic impotence as much as the female does" (1975, p.56). However, to the extent that ejaculation and orgasm are related, the probability of being caught faking is greater for men than for women. Thus, the model predicts a lower probability of faking for men than for women. More generally, the model predicts that any factor that increases the cost of faking or the probability of being caught faking for either men or women lowers their probability of faking. Thus, men and women who believe that their partner can tell whether they are faking should be less likely to fake.

Another factor that may be related to faking is age. In the model, the man and woman each have a prior belief about the other's state of ecstasy, and these priors are associated with the other's sex drive, which varies in different ways for men and women over the life-cycle. Male sex drive is highest during the early twenties and declines steadily into old age, while female sex drive is low during the teens, increases during the twenties, reaches a maximum in the late twenties, and then declines into old age (Mahoney, 1983, pp. 45-46, and Kinsey *et al.*, 1968, p.759).[2]   Therefore, when a woman is middle-aged, her partner's prior belief

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[2] One explanation is hormones. Levels of the 17-ketosteroids rise sharply in females during the late teens, peak somewhere in the mid twenties, drop sharply until the mid thirties, stay constant until the late fifties, then drop further. On the other hand, the male sex hormone testosterone is at its highest during the late

that she is in ecstasy during lovemaking may be generally higher than when she is younger or older. On the other hand, when a man is young, his partner's prior belief that he is in ecstasy may be higher than when he is either middle-aged or older. In the model, the man or woman's equilibrium probability of faking depends on his or her partner's prior belief. In particular, the model predicts that younger men are less likely to fake than middle-aged or older men, and middle-aged women are less likely to fake than younger or older women.

One more factor may be crucial in determining the amount of deception between a man and woman: love. "It was the men I deceived the most that I loved the most," wrote the French author Marguerite Duras (1990, p. 203). But what is love? In the model, we formalize love as a mixture of altruism and demand for togetherness. We show that love alters the man and the woman's payoff functions in a way that increases their equilibrium probability of faking.

The model's predictions are tested on data gathered from the 2000 Orgasm Survey. In the survey, people were directly asked whether they had ever faked an orgasm in their current relationship, whether they believe they can tell whether their partner is faking, and whether they believe their partner can tell whether they are faking. People were also asked their age and education level as well as questions related to how much love they feel for their partner. Twenty-seven percent of men in the sample report having faked. Moreover, while seventy-four percent of women in the sample report having faked, only fifty-five percent of men in the sample believe they can tell whether their partner is faking, which suggests that, while most women have faked, not all men are confident it has never happened to them.

Moreover, the data support most of the other predictions of the rational model: men and women who believe their partner can tell whether they are faking are less likely to fake;

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teens and early twenties, then gradually falls over the remainder of a man's lifetime.

men and women who love their partner are more likely to fake; men who are closer to age eighteen are less likely to fake than men who are older; and, among women who are in love, those who are closer to age thirty are less likely to fake than those who are younger or older. In addition, the data reveal an interesting positive relationship between education and the tendency to fake in both men and women.

The remainder of the paper is organized as follows. Section 2 discusses related economic literature. Section 3 develops the signaling model of rational lovemaking. In section 4, the model is solved and the resulting testable predictions are highlighted. Section 5 contains a description of the data and variables that are used to test the predictions of the theory. Section 6 contains the empirical model. In section 7, the empirical results are compared with the theory. Section 8 summarizes key findings and concludes.

2. Related Literature

This paper is an application to the study of human sexuality of the economic approach to human behavior pioneered by Becker (1976). We postulate that even in intimate relations, people make choices that maximize their expected payoff as they conceive it, whether they be selfish or loving. The resulting model yields testable predictions about how lovemaking behavior depends on the characteristics of individuals and their lovemaking environment.

Surprisingly, applications of economics to human sexuality are sparse. Existing papers include Allen and Brinig (1998) on sex drive and bargaining power within the family, Oettinger (1999) on sex education and teen sexual activity, Rasmusen (2000) and Elmslie and Tebaldi (2008) on adultery, Francis (2008) on homosexuality, and Morrow and Sivan (2006) on casual sex. None of the existing papers model signaling aspects of lovemaking, the focus of this study.

The theory of signaling is well developed in economics. Spence (1974) developed the classic model of education as a signal of ability in the job market. Recently, signaling theory has been applied to shed light on a number of other interesting behavioral phenomena, including the "too cool for school" phenomenon (Feltovich, Harbaugh, and To, 2002), the "acting white" phenomenon (Fryer, 2005), and the "false modesty" phenomenon (Harbaugh and To, 2009). However, none of the existing papers have explored the "faking it" phenomenon that we explore here.

Lastly, note that one of the interesting contributions of the present paper is a formal characterization of love. In economics, love has usually been modeled as altruism. Becker (1974) defined parental love as altruism to derive his famous Rotten Kid Theorem. Bergstrom (1989) defined romantic love as altruism to pose a puzzle about the allocation of spaghetti between lovers. The present paper defines romantic love more generally as a mixture of altruism and demand for togetherness.

3.   A Theoretical Model of Lovemaking

Consider signaling games $\Gamma_{s,r}$ with players $s, r \in \{Harry, Sally\}$, $s \neq r$, where player s is the sender and player r is the receiver. Nature starts by choosing whether or not sender s is in ecstasy. The prior probability that sender s is in ecstasy is $\alpha_s \in (0,1)$. Sender s then learns whether or not he or she is in ecstasy and chooses whether to moan or to remain silent. Not knowing whether or not s is in ecstasy, but observing whether s is moaning or silent, receiver r then chooses whether to act as though s is in ecstasy (this could involve feeling worthy and forging ahead) or to act as though s is not in ecstasy (this could involve feeling inadequate and shying away).

For simplicity, we make a "no quiet orgasms" assumption. That is, we assume that s

never remains silent (always moans) when in ecstasy. Given this assumption, if s remains silent, then r knows for certain that s is not in ecstasy and therefore always acts as though s is not in ecstasy.

Sender s chooses whether to moan when not in ecstasy, the *Fake* strategy, or remain silent when not in ecstasy, the *Honest* strategy. Receiver r chooses whether to act as though s is in ecstasy when s is moaning, the *Confident* strategy, or act as though s is not in ecstasy when s is moaning, the *Insecure* strategy.

The prior that s is in ecstasy, α_s, is assumed to depend, *inter alia*, on s's biological age. As discussed in the introduction, the sex drives of men and women vary in different ways over the life-cycle. It is taken as stylized facts that the lifetime evolutions of Harry and Sally's sex drives resemble those drawn in Figure 1.[3]

Harry's sex drive is higher when he is young than when he is middle-aged or old, while Sally's sex drive is higher when she is middle-aged than when she is young or old. Thus, in game $\Gamma_{Harry,Sally}$, the prior belief that Harry is in ecstasy during love-making, α_{Harry}, is assumed to be higher when Harry is young than when he is either middle-aged or older. On the other hand, in game $\Gamma_{Sally,Harry}$, the prior belief that Sally is in ecstasy is assumed to be higher when Sally is middle-aged than when she is young or old.

3.1   Sender and Receiver Payoffs

Let $\overline{c}_s$ denote the sender's cost of faking, which includes the physical difficulties of faking and the expected awkwardness if the receiver realizes the moaning is fake. Naturally, we assume $\overline{c}_{Harry} > \overline{c}_{Sally}$. Let $\overline{v}_r$ denote the receiver's utility from the sender's moaning, which

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[3] Allen and Brinig (1998) analyze the implications of these stylized facts for divorce. They argue that the spouse having the lowest demand for sex at any time in the marriage has a property right over the occurrence of sex. For this reason, the wife may have more bargaining power at the margin in young couples, while the husband may have more bargaining power at the margin in middle-aged couples.
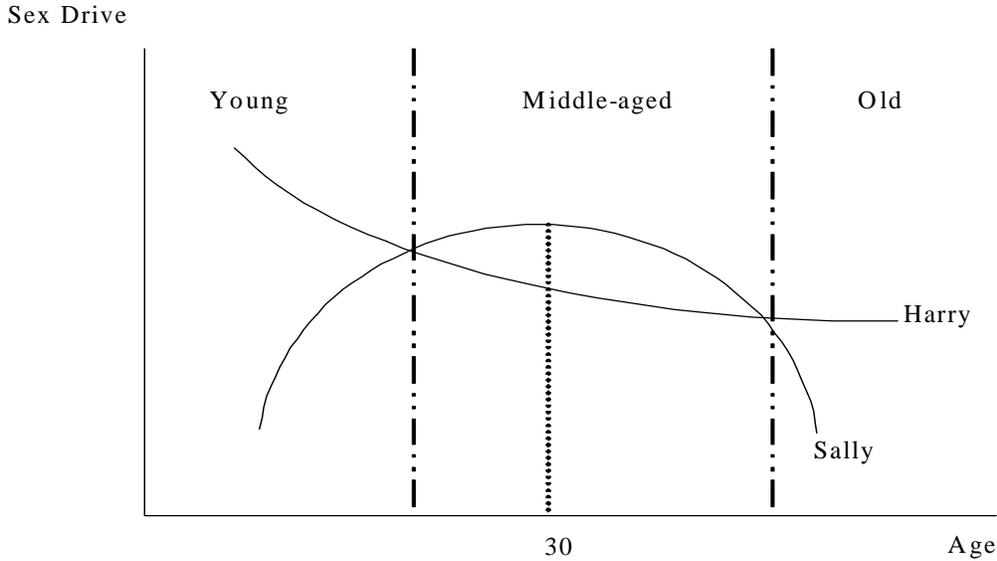
Sex Drive

Figure 1: The lifetime evolutions of Harry and Sally's sex drives.

is experienced whether the moaning is real or fake. Ecstasy may produce moaning, but moaning may also multiply the ecstasy. Through this parameter, ecstasy is also to some extent endogenous in the model.

Let $\overline{e}_r^1$ denote the receiver's disutility from mistakenly acting insecure and $\overline{e}_r^2$ denote the receiver's disutility from mistakenly acting confident. When the receiver takes a mistaken action, there is a chance that the receiver subsequently discovers the mistake and feels the associated remorse or embarrassment. Let $\overline{e}_s^1$ denote the sender's disutility from the receiver mistakenly acting insecure and $\overline{e}_s^2$ denote the sender's disutility from the receiver mistakenly acting confident. Indeed, one reason not to fake it is that the other might believe it, which would deny him the feedback he needs to improve.

We have five possible outcomes: (Ecstasy / Moan, Confident), (Ecstasy / Moan, Insecure), (No ecstasy / Fake, Confident), (No ecstasy / Fake, Insecure), and (No ecstasy /

Table 1: Normal Form of Games $\Gamma_{s,r}$, $s, r \in \{Harry, Sally\}$, $s \neq r$

	Confident	Insecure
Fake	$\alpha_s[0] + (1 - \alpha_s)[-\overline{c}_s - \overline{e}_s^2],$ $\alpha_s[\overline{v}_r] + (1 - \alpha_s)[\overline{v}_r - \overline{e}_r^2]$	$\alpha_s[-\overline{e}_s^1] + (1 - \alpha_s)[-\overline{c}_s],$ $\alpha_s[\overline{v}_r - \overline{e}_r^1] + (1 - \alpha_s)[\overline{v}_r]$
Honest	$\alpha_s[0] + (1 - \alpha_s)[0],$ $\alpha_s[\overline{v}_r] + (1 - \alpha_s)[0]$	$\alpha_s[-\overline{e}_s^1] + (1 - \alpha_s)[0],$ $\alpha_s[\overline{v}_r - \overline{e}_r^1] + (1 - \alpha_s)[0]$

Honest, Insecure).[4] The payoffs for (Ecstasy / Moan, Confident) are 0 for the sender s and $\overline{v}_r$ for the receiver r. The payoffs for (Ecstasy / Moan, Insecure) are $-\overline{e}_s^1$ for the sender and $\overline{v}_r - \overline{e}_r^1$ for the receiver. The payoffs for (No ecstasy / Fake, Confident) are $-\overline{c}_s - \overline{e}_s^2$ for the sender and $\overline{v}_r - \overline{e}_r^2$ for the receiver. The payoffs for (No ecstasy / Fake, Insecure) are $-\overline{c}_s$ for the sender and $\overline{v}_r$ for the receiver. The payoffs for (No ecstasy / Honest, Insecure) are 0 for the sender and receiver.

The normal form of the games $\Gamma_{s,r}$, $s, r \in \{Harry, Sally\}$, $s \neq r$, is given in Table 1. Player s is the row player and player r is the column player.

3.2 What's Love Got to Do With It?

The sender and receiver's payoffs also depend on whether they are in love. We formalize love in the model as part caring and part demand for togetherness. To the extent that the sender and receiver care for each other, the receiver does not like it when the sender has to incur a cost of faking, and the sender likes it when the receiver enjoys the sender's moaning. Moreover, to the extent that the sender and receiver have a demand for togetherness, the sender does not mind as much if the receiver is mistakenly confident (feeling worthy), and the receiver does not mind as much if he or she is mistakenly confident (not recoiling).

Let κ_s denote the sender's care for the receiver and κ_r denote the receiver's care for the sender, where $\kappa_s, \kappa_r \in [0, 1]$, and let τ_s denote the sender's demand for togetherness with the receiver and τ_r denote the receiver's demand for togetherness with the sender, where

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[4] The (No ecstasy / Honest, Confident) outcome is ruled out by the "no quiet orgasms" assumption.

Table 2: Normal Form of Games $\Gamma_{s,r}$, $s,r \in \{Harry, Sally\}$, $s \neq r$, with Love

	Confident	Insecure
Fake	$\alpha_s[\kappa_s\overline{v}_r]$ $+ (1-\alpha_s)[-\overline{c}_s - (1-\tau_s)\overline{e}_s^2 + \kappa_s\overline{v}_r - \kappa_s(1-\tau_r)\overline{e}_r^2],$ $\alpha_s[\overline{v}_r]$ $+ (1-\alpha_s)[\overline{v}_r - (1-\tau_r)\overline{e}_r^2 - \kappa_r\overline{c}_s - \kappa_r(1-\tau_s)\overline{e}_s^2]$	$\alpha_s[-\overline{e}_s^1 + \kappa_s\overline{v}_r - \kappa_s\overline{e}_r^1]$ $+ (1-\alpha_s)[-\overline{c}_s + \kappa_s\overline{v}_r],$ $\alpha_s[\overline{v}_r - \overline{e}_r^1 - \kappa_r\overline{e}_s^1]$ $+ (1-\alpha_s)[\overline{v}_r - \kappa_r\overline{c}_s]$
Honest	$\alpha_s[\kappa_s\overline{v}_r]$ $+ (1-\alpha_s)[0],$ $\alpha_s[\overline{v}_r]$ $+ (1-\alpha_s)[0]$	$\alpha_s[-\overline{e}_s^1 + \kappa_s\overline{v}_r - \kappa_s\overline{e}_r^1]$ $+ (1-\alpha_s)[0],$ $\alpha_s[\overline{v}_r - \overline{e}_r^1 - \kappa_r\overline{e}_s^1]$ $+ (1-\alpha_s)[0]$

$\tau_s, \tau_r \in [0,1]$.

Defined in these terms, love alters payoffs as follows. The payoffs for (Ecstasy / Moan, Confident) are now $\kappa_s\overline{v}_r$ for the sender s and $\overline{v}_r$ for the receiver r. The payoffs for (Ecstasy / Moan, Insecure) are $-\overline{e}_s^1 + \kappa_s\overline{v}_r - \kappa_s\overline{e}_r^1$ for the sender and $\overline{v}_r - \overline{e}_r^1 - \kappa_r\overline{e}_s^1$ for the receiver. The payoffs for (No ecstasy / Fake, Confident) are $-\overline{c}_s - (1-\tau_s)\overline{e}_s^2 + \kappa_s\overline{v}_r - \kappa_s(1-\tau_r)\overline{e}_r^2$ for the sender and $\overline{v}_r - (1-\tau_r)\overline{e}_r^2 - \kappa_r\overline{c}_s - \kappa_r(1-\tau_s)\overline{e}_s^2$ for the receiver. The payoffs for (No ecstasy / Fake, Insecure) are $-\overline{c}_s + \kappa_s\overline{v}_r$ for the sender and $\overline{v}_r - \kappa_r\overline{c}_s$ for the receiver. The payoffs for (No ecstasy / Honest, Insecure) remain at 0 for the sender and receiver.

With love, the normal form of the games is given in Table 2, where α_s is the prior that the sender is in ecstasy. Note that the games in Table 2 simplify to the games in Table 1 when the caring and togetherness parameters, κ and τ, are all set equal to zero.

4. Equilibrium Predictions

The following proposition analyzes the Nash equilibria of the games in Table 2.

Proposition 1 *Consider the games $\Gamma_{s,r}$, $s,r \in \{Harry, Sally\}$, $s \neq r$, in Table 2, and let*

$$\widehat{\alpha}_s \equiv \frac{(1-\tau_r)\overline{e}_r^2 + \kappa_r(1-\tau_s)\overline{e}_s^2}{(1-\tau_r)\overline{e}_r^2 + \kappa_r(1-\tau_s)\overline{e}_s^2 + \overline{e}_r^1 + \kappa_r\overline{e}_s^1}.$$

(1) If $\kappa_s\overline{v}_r < \overline{c}_s$, the unique equilibrium is (Honest, Confident).
(2) Suppose that $\kappa_s\overline{v}_r > \overline{c}_s + (1-\tau_s)\overline{e}_s^2 + \kappa_s(1-\tau_r)\overline{e}_r^2$.

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(a) If $\alpha_s > \widehat{\alpha}_s$, the unique equilibrium is (Fake, Confident).
(b) If $\alpha_s < \widehat{\alpha}_s$, the unique equilibrium is (Fake, Insecure).
(3) Suppose now that $\overline{c}_s < \kappa_s \overline{v}_r < \overline{c}_s + (1 - \tau_s)\overline{e}_s^2 + \kappa_s(1 - \tau_r)\overline{e}_r^2$.
(a) If $\alpha_s > \widehat{\alpha}_s$, the unique equilibrium is (Honest, Confident).
(b) If $\alpha_s < \widehat{\alpha}_s$, the pure-strategy equilibria are (Fake, Insecure) and (Honest, Confident), and there is also a mixed-strategy equilibrium in which the sender randomizes between Fake and Honest and the receiver randomizes between Confident and Insecure.

Proof. See Mathematical Appendix. ∎

The only equilibria that can arise are (Honest, Confident), (Fake, Insecure), (Fake, Confident) and/or a randomization between (Honest, Confident) and (Fake, Insecure). (Honest, Confident) is the unique equilibrium for any value of the prior α_s in the parameter range $\kappa_s \overline{v}_r < \overline{c}_s$, and this parameter range is larger if the cost of faking $\overline{c}_s$ is higher. Thus, we have a first prediction:

TP1 A higher cost of faking lowers the likelihood of faking for both women and men.

The prior α_s only affects whether or not Fake is part of the equilibrium set if $\overline{c}_s < \kappa_s \overline{v}_r < \overline{c}_s + (1 - \tau_s)\overline{e}_s^2 + \kappa_s(1 - \tau_r)\overline{e}_r^2$. In this case, (Fake, Insecure) is an equilibrium only if α_s is sufficiently low; otherwise, (Honest, Confident) is the unique equilibrium. As argued previously, α_s is lower for middle-aged and old men than for young men and is lower for young and old women than for middle-aged women. Thus, we have two more predictions:

TP2 Middle-aged and old men are more likely to fake than young men.

TP3 Young and old women are more likely to fake than middle-aged women.

The only parameter range in which (Honest, Confident) is the unique equilibrium, $\kappa_s \overline{v}_r < \overline{c}_s$, is smaller if caring κ_s is higher. Moreover, the only parameter range in which Fake is part of the unique equilibrium for any value of the prior α_s, $\kappa_s \overline{v}_r > \overline{c}_s + (1 - \tau_s)\overline{e}_s^2 + \kappa_s(1 - \tau_r)\overline{e}_r^2$, is larger if demands for togetherness τ_s and τ_r are higher. Thus, we have a fourth prediction:

TP4 Love increases the likelihood of faking for both women and men.

5. Data

Data that can be used to test the predictions of the model were gathered from the 2000 Orgasm Survey (the name of the survey is chronological, not quantitative). The survey was devised by the professional psychologists and statisticians of PsychTests, a firm that specializes in online testing for academic and business purposes.[5] The online survey was answered voluntarily and anonymously. People were asked a variety of questions concerning their sexual experiences in their current or most recent relationship. Several of the questions addressed the subject of faking orgasm.

Those people who were drawn to answer the survey might have also been those who have a greater tendency to fake or who are more suspicious that their partner is faking. Thus, the following results may contain a selection bias due to the sampling procedure.

Table 3 contains a description of the key variables that were constructed from the survey. The variable *Fake* is the main dependent variable. The variable *BelieveConfident* is a proxy for the probability of being caught faking, insofar as people can accurately guess whether their partner can tell if they are faking.

The variable *Altruism* is a possible measure of altruism. If people express a strong preference for their partner's sexual pleasure, this might suggest that they care for their partner. However, it might also suggest that they want to demonstrate their own sexual prowess. With this caveat, *Altruism* will serve as our measure of the parameter κ in our model.

A measure of the demand for togetherness parameter τ in the model is also available. In the model, demand for togetherness reduces the sender's disutility from the receiver's mistaken confidence and reduces the receiver's disutility from his or her own mistaken confi-

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[5] See website: www.psychtests.com. The data from the survey are available from the author upon request.

Table 3: Description of Key Variables

Notation for Variable	Description of Variable	Value of Variable
Fake	Have you faked an orgasm?	1 = Yes, 0 = No
Confident	Can you tell if your partner is faking?	1 = Yes, 0 = No
BelieveConfident	Can your partner tell if you are faking?	1 = Yes, 0 = No
Age	Age	$14 \leq Age \leq 74$
Altruism	How important is it to you that your partner reach orgasm?	1 = Extremely, 0 = o/w (Altruism 1) 1 = Very, 0 = o/w (Altruism 2) 1 = Somewhat, 0 = o/w (Altruism 3)
Togetherness	How would you feel about your partner faking an orgasm?	1 = Embarrassed, Guilty, Bad for partner, Flattered, Happy 0 = Angry, Deceived, Ridiculed, Inadequate, Betrayed, Appalled
UtilityFake	Would you want your partner to fake it if s/he had not spontaneously reached orgasm?	1 = Yes 0 = No
AgeLostVirginity	How old were you when you lost your virginity?	$14 \leq Age \leq 74$
SexFrequency	How often do you typically have sex (except for solo)	1 = Never, 2 = Several times/day... 5 = 2-4 times/week, 6 = Once/week... 12 = Once/year, 13 = Less once/year
Education	Formal education	9 = Sec 3 or less... 12 = High school... 14 = Some undergrad... 16 = BA... 18 = MA... 21 = post-doc

Table 4: Summary Statistics

Variable	Women	(N=3012)	Men	(N=1955)
	Mean	Std. Dev.	Mean	Std. Dev.
Fake	0.74	0.44	0.27	0.45
Confident	0.75	0.43	0.55	0.50
BelieveConfident	0.25	0.43	0.66	0.47
Age	26.48	7.95	28.54	9.31
UtilityFake	0.04	0.19	0.05	0.23
AgeLostVirginity	16.51	2.44	17.25	3.05
SexFrequency	5.45	1.37	5.58	1.53
Education	13.91	1.90	14.33	2.29

dence. This second effect is captured by the variable *Togetherness* in Table 3. Respondents were asked how they would feel about their partner faking an orgasm. If they expressed negative feelings toward their partner (Angry, Deceived, Ridiculed, Inadequate, Betrayed, Appalled) at the prospect of their partner faking, this suggests that their disutility from their own mistaken confidence is high. If they expressed negative feelings toward themselves (Embarrassed, Guilty, Bad for my partner) or positive feelings toward their partner (Flattered, Happy), this suggests that their disutility from their own mistaken confidence is low.

We restrict the sample to heterosexuals 18 years of age and over.[6] We also eliminate from the sample any person who either never had sex before, is currently inactive (and working on memory), or is currently having sex with multiple partners.

Table 4 contains summary statistics for each of the variables in Table 3 except for those relating to love. Interestingly, Table 4 reveals that 74 percent of women and 27 percent of men have faked an orgasm in their current or most recent relationship. On the other hand, 75 percent of women and 55 percent of men believe they could tell if their current or most recent partner had faked an orgasm. Not all women fake and definitely not all men are confident, which provides some evidence against Sally's claim in the movie "When Harry Met Sally" (reproduced at the start of the introduction).

Notice also that 66 percent of men believe that their partners can tell whether they are faking, versus only 25 percent of women. These data suggest that the probability of being caught faking is much greater for men than for women, which explains why the percent of men who report having faked is much lower than the percent of women who report this.

Table 5 contains summary statistics for each of the variables relating to love in Table 3. Note that 45 percent of men, compared to only 43 percent of women, say that it is extremely

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[6] The theoretical model could be modified to address faking behavior in gay and lesbian couples. This would be an interesting avenue for future research.

Table 5: Percent Distributions of Altruism and Togetherness

How important is it to you that your partner reaches orgasm? (Altruism)	Women	Men
Extremely	43.1	45.1
Very	42.4	42.0
Somewhat	13.0	11.6
Not at all	1.5	1.3
How would you feel about your partner faking? (Togetherness)	**Women**	**Men**
Embarrassed; Guilty; Bad for partner; Flattered; Happy	56.1	47.9
Angry; Deceived; Ridiculed; Inadequate; Betrayed, Appalled	43.9	52.1

important that their partner reaches orgasm. However, the chi-square test does not reject the hypothesis that *Altruism* is independent of gender. On the other hand, only 44 percent of women, compared to 52 percent of men, express negative feelings toward their partner at the prospect of their partner faking. Thus, the data suggest that women have a greater demand for togetherness than men, in the sense that they would be less devastated than men if they were to discover that their confidence was misplaced.

6. An Empirical Model of Lovemaking

The sample is divided into two groups: W, the set of women, and M, the set of men. Variations on the following basic empirical model for women are estimated:

$$\Pr(Fake_w = 1) = \Phi(\beta_0^w + \beta_1^w BelieveConfident_w + \beta_2^w Y_w + \beta_3^w Love_w \tag{1}$$

$$+ \beta_4^w D_1 * (a_w^* - Age_w) + \beta_5^w D_2 * (Age_w - a_w^*)$$

$$+ \beta_6^w D_1 * (a_w^* - Age_w) * Love_w + \beta_7^w D_2 * (Age_w - a_w^*) * Love_w).$$

Φ is the cumulative normal distribution, and equation (1) is a probit model. The variables *Togetherness* and *Altruism* will serve as proxies for love. The variables D_1 and D_2 are dummies, where $D_1 = 1$ if $a_w^* \geq Age$, and $D_2 = 1$ if $Age \geq a_w^*$. The parameter a_w^* is the woman's lifetime peak of sex drive. The sex literature discussed in the introduction suggests that women reach their peak sex drive around the age of thirty. Therefore, we

let $a_w^* = 30$. The vector Y_w is a vector of controls which includes the variables *Education*, *AgeLostVirginity*, *UtilityFake*, and *SexFrequency*.

Variations of the following basic empirical model for men are also estimated:

$$\Pr(Fake_m = 1) = \Phi(\beta_0^m + \beta_1^m BelieveConfident_m + \beta_2^m Y_m + \beta_3^m Love_m \tag{2}$$
$$+ \beta_4^m(Age_m - a_m^*) + \beta_5^m(Age_m - a_m^*) * Love_m)$$

The parameter a_m^* is the man's lifetime peak of sex drive. The sex literature discussed in the introduction suggests that men reach their lifetime peak of sex drive in their late teens. Therefore, we let $a_m^* = 18$. The vector Y_m contains the same controls as in Y_w.

7. Results

Table 6 presents the marginal effects for regressions (1) and (2). The coefficients on the *BelieveConfident* variable are negative and statistically significant in all four columns. Men and women who believe that their partners can tell if they are faking are significantly less likely to fake than men and women who believe that their partners cannot tell if they are faking. This finding is consistent with the theoretical model's prediction that an increase in the cost of faking reduces the probability of faking (TP1).

The coefficients on the $Age - 18$ variable for men (in the last two columns) are positive and statistically significant. Men who are closer to age 18 are less likely to fake than men who are older. This result is consistent with prediction TP2 of the theoretical model.

The coefficients on the $D_1 * (30 - Age)$ variable for women (in the first two columns) are negative and statistically significant; the coefficients on $D_2 * (Age - 30)$ (in the first two columns) are positive but not statistically significant; and the coefficients on $D_1 * (30 - Age) *$ *Altruism 1* and $D_2 * (Age - 30) *$ *Altruism 1* (in the second column) are positive and significant. Among women who are not in love, those who are closer to age 30 are more

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Table 6: Marginal Effects on the Probability of Faking

	Women ($N = 3012$)		Men ($N = 1955$)	
	(1)	(2)	(3)	(4)
BelieveConfident	-.2975	-.2968	-.2237	-.2234
	(.0204)**	(.0204)**	(.0224)**	(.0224)**
UtilityFake	0.1632	.1632	.0981	.0961
	(.0280)**	(.0280)**	(.0490)**	(.0490)**
Togetherness	.1061	.1059	.0652	.0651
	(.0166)**	(.0166)**	(.0208)**	(.0208)**
Altruism 1	.2140	.1220	-.0017	.0173
	(.0552)**	(.0651)*	(.0859)	(.0887)
Altruism 2	.1789	.1756	-.0213	-.0238
	(.0558)**	(.0560)**	(.0854)	(.0853)
Altruism 3	.1277	.1262	-.0671	-.0694
	(.0460)*	(.0463)**	(.0792)	(.0788)
$D_1*(30 - Age)$	-.0078	-.0134		
	(.0022)**	(.0028)**		
$D_2*(Age - 30)$	.0021	-.0017		
	(.0022)	(.0027)		
$(Age - 18)$			.0047	0055
			(.0012)**	(.0015)**
$D_1*(30 - Age)*$ Altruism 1		.0135		
		(.0043)**		
$D_2*(Age - 30)*$ Altruism 1		.0104		
		(.0046)**		
$(Age - 18)*$ Altruism 1				-.0020
				(.0022)
AgeLostVirginity	-.0188	-.0185	-.0164	-.0164
	(.0033)**	(.0033)**	(.0036)**	(.0036)**
Education	.0078	.0073	.0129	.0128
	(.0045)*	(.0045)	(.0046)**	(.0046)**
Pseudo R^2	.1145	.1175	.0735	.0739

Standard errors are in parenthesis. All regressions also control for SexFrequency.

** indicates significance at the 5% level, and * indicates significance at the 10% level.

likely to fake than those who are younger. However, among women who are in love, women who are closer to age 30 are less likely to fake than women who are either younger or older. Thus, the results are partly consistent with prediction TP3 of the theoretical model.

The coefficients on the *Togetherness* variable are positive and statistically significant in all four columns. Men and women who have a greater demand for togetherness are more likely to fake. The coefficient on the Altruism variables are positive and statistically significant in the first two columns (for women). Women who care about their partner's sexual pleasure are more likely to fake. These results are consistent with the theoretical model's prediction that love increases the probability of faking (TP4).

Lastly, the coefficients on the *Education* variable are positive and statistically significant in three of the four columns and positive and nearly statistically significant in the other column. Men and women with more education are more likely to fake. Even this result may not be inconsistent with a rational model. Lovemaking takes time and people with more education may have a higher opportunity cost of time and may therefore be more likely to fake just to get it over with, perhaps so they can return to writing papers!

8. Conclusion

This paper applied rational choice theory to the study of an interesting aspect of human sexuality, faking ecstasy in lovemaking. Lovemaking was modeled as a signaling game, and it was shown that the equilibrium probability of faking is decreasing in the cost of faking and increasing in the strength of love (formally defined as a mixture of caring and demand for togetherness). These predictions were tested with available survey data. In accordance with the theory, measures of love were found to be positively correlated, while measures of faking costs were found to be negatively correlated, with faking.

Overall, we found that the rational model performs quite well—even in the bedroom. In future work, it would be interesting to test the predictions of the model experimentally!

A   Mathematical Appendix

Proof of Proposition 1. From the normal form in Table 2, we find that the receiver's best response to the sender choosing Honest is always to choose Confident. The receiver's best response to the sender choosing Fake is to choose Confident iff

$$\alpha_s > \frac{(1-\tau_r)\overline{e}_r^2 + \kappa_r(1-\tau_s)\overline{e}_s^2}{(1-\tau_r)\overline{e}_r^2 + \kappa_r(1-\tau_s)\overline{e}_s^2 + \overline{e}_r^1 + \kappa_r\overline{e}_s^1} \equiv \widehat{\alpha}_s. \tag{3}$$

On the other hand, the sender's best response to the receiver choosing Confident is to choose Honest iff

$$\kappa_s\overline{v}_r < \overline{c}_s + (1-\tau_s)\overline{e}_s^2 + \kappa_s(1-\tau_r)\overline{e}_r^2. \tag{4}$$

The sender's best response to the receiver choosing Insecure is to choose Honest iff

$$\kappa_s\overline{v}_r < \overline{c}_s. \tag{5}$$

Therefore, if $\kappa_s\overline{v}_r < \overline{c}_s$, the only mutual best response or Nash equilibrium is (Honest, Confident); if $\kappa_s\overline{v}_r > \overline{c}_s + (1-\tau_s)\overline{e}_s^2 + \kappa_s(1-\tau_r)\overline{e}_r^2$, then if $\alpha_s > \widehat{\alpha}_s$, the only equilibrium is (Fake, Confident), and if $\alpha_s < \widehat{\alpha}_s$, the only equilibrium is (Fake, Insecure); and if $\overline{c}_s < \kappa_s\overline{v}_r < \overline{c}_s + (1-\tau_s)\overline{e}_s^2 + \kappa_s(1-\tau_r)\overline{e}_r^2$, then if $\alpha_s > \widehat{\alpha}_s$, the only equilibrium is (Honest, Confident), and if $\alpha_s < \widehat{\alpha}_s$, there are two pure-strategy equilibria, (Fake, Insecure) and (Honest, Confident), and a mixed-strategy equilibrium that randomizes between (Fake, Insecure) and (Honest, Confident). Q.E.D.

REFERENCES

Akerlof, George A. and Dickens, William T. (1982): "The Economic Consequences of Cognitive Dissonance," *American Economic Review* 72, 307-319.

Allen, Douglas W., and Brinig, Margaret (1998): "Sex, Property Rights, and Divorce," *European Journal of Law and Economics* 5, 211-33.

Becker, Gary S. (1974): "A Theory of Social Interactions," *Journal of Political Economy* 82, 1063-1093.

Becker, Gary S. (1976): *The Economic Approach to Human Behavior*, University of Chicago Press.

Bergstrom, Ted (1989): "Love and Spaghetti, The Opportunity Cost of Virtue," *Journal of Economic Perspectives* 3, 165-173.

Columbia Pictures (1989): "When Harry Met Sally," Directed by Rob Reiner, Written by Nora Ephron, Starring Meg Ryan and Billy Crystal.

Duras, Marguerite (1990): *Practicalities*, London: Penguin Books.

Elmslie, Bruce and Tebaldi, Edinaldo (2008): "So, What Did You do Last Night? The Economics of Infidelity," *Kyklos* 61, 391-410.

Feltovich, Nick, Harbaugh, Richmond and To, Ted (2002): "Too Cool for School? Signalling and Countersignalling," *RAND Journal of Economics* 33, 630-649.

Francis, Andrew M. (2008): "The Economics of Sexuality: The Effect of HIV/AIDS on Homosexual Behavior, Desire, and Identity in the United States," *Journal of Health Economics* 27, 675-689.

Fryer, Roland (2005): "An Economic Analysis of 'Acting White,'" *Quarterly Journal of Economics* 120, 551-583..

Harbaugh, Richmond and To, Theodore (2009): "False Modesty: When Disclosing Good News Looks Bad," Working Paper.

Kinsey, Alfred C., Pomeroy, Wardell B., Martin, Clyde E., and Gebhard, Paul H. (1968): *Sexual Behavior in the Human Female*, Philadelphia: W.B. Saunders Company.

Lowen, A. (1975): *Love and Orgasm: A Revolutionary Guide to Sexual Fulfillment*, Collier Books.

Mahoney, E.R. (1983): *Human Sexuality*, New York: McGraw-Hill.

Morrow, John and Sivan, Yoav (2006): "Strategic Interaction in the Sex Market," MPRA Working Paper No. 888.

Oettinger, Gerald S. (1999): "The Effects of Sex Education on Teen Sexual Activity and Teen Pregnancy," *Journal of Political Economy* 107, 606-644.

Rasmusen, Eric (2002): "An Economic Approach to Adultery Law," Chapter 5 of *Marriage and Divorce: An Economic Perspective*, edited by Antony Dnes and Robert Rowthorn, Cambridge: Cambridge University Press.

Spence, Michael A. (1973): "Job Market Signaling," *Quarterly Journal of Economics* 87, 355-374.