

# Experimental Induction of Friendship Jealousy: Comparing the Effects of Time versus Mental Coordination with an Interloper

## Inducción Experimental de Celos en la Amistad: Comparación de los Efectos del Tiempo frente a la Coordinación Mental con un Rival

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Jealousy is an emotional response to the threat of losing a valued relationship. In this research, we revisit the proposal that jealousy in friendship is an evolved response to the threat of someone else replacing what is unique in this kind of relationship. Burkett (2009) found that most people identify mental coordination—responding to the world as you do—as the feature that makes their best friend uniquely valuable to them. We presented 305 Chilean participants with one of three hypothetical conditions, in which their best friend: i) spent most of their time with a new friend, ii) shared mental coordination with a new friend, or iii) spent most of their time and shared mental coordination with a new friend. We replicated the expected effect in this novel context: Friendship jealousy was evoked more strongly by the threat of losing mental coordination with a friend than by just losing time spent with them, and friendship jealousy was higher for women than to men. We discuss the implications of these findings in order to understand friendships evolutionary basis and psychology, as well as other close relationships, and other types of non-pathological jealousy.

*Keywords:* close relationships, cooperation, rivalry, jealousy, mental coordination

Los celos son una respuesta emocional a la amenaza de perder una relación valiosa. En esta investigación, revisamos la propuesta que los celos en la amistad son una respuesta evolucionada a la amenaza de que otra persona reemplace lo que es único en una amistad. Burkett (2009) descubrió que la mayoría de las personas identifican la coordinación mental (responder al mundo como uno lo hace) como la característica que hace que su mejor amigo/a sea especialmente valioso/a. Presentamos a 305 participantes chilenos una de tres condiciones hipotéticas, en las que su mejor amigo/a: i) pasaba la mayor parte del tiempo con un/a nuevo/a amigo/a, ii) compartía la coordinación mental con un/a nuevo/a amigo/a, o iii) pasaba la mayor parte del tiempo y compartía la coordinación mental con un/a nuevo/a amigo/a. Replicamos el efecto esperado en este contexto novedoso: los celos de amistad fueron evocados con más fuerza por la amenaza de perder la coordinación mental con un amigo/a que simplemente por perder el tiempo que pasaban con su amigo/a, y los celos de amistad fueron más altos para las mujeres en comparación con los hombres. Discutimos las implicaciones de estos hallazgos para comprender la base evolucionista y la psicología de las amistades, así como otras relaciones cercanas, y para comprender otros tipos de celos no patológicos.

*Palabras clave:* relaciones cercanas, cooperación, rivalidad, celos, coordinación mental

Jealousy is a complex emotion designed to protect a valued relationship from potential interlopers (Buunk, 1997; Chung & Harris, 2018). Most research on jealousy has centered on the function of sexual jealousy to prevent attractive rivals from usurping a mating partner (Buss et al., 1992; Buss, 2018). Friendship jealousy has been mostly overlooked. A few works address infant jealousy as an emotion emerging when social rivals (e.g., siblings) challenge maternal care and attention (Hart, 2017); children are more likely to feel friendship jealousy when a relationship is threatened by other relationships (Deutz et al., 2014); and Lennarz et al. (2017) identified adolescent jealousy as arising most commonly in online contexts. Krems et

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al. (2021) confirmed in a series of studies that friendship jealousy emerges when one perceives a third-party threat to a valued friendship.

But what constitutes a threat to one's relationship with a best friend? According to the banker's paradox model (Tooby & Cosmides, 1996), a key adaptive problem for our hominin ancestors was obtaining help in crises: situations in which injury, illness, or misfortune compromised their ability to forage or reciprocate favors. Kin have motivations to help regardless of reciprocation, but most individuals do not: When someone becomes a bad "credit risk"—when they may not recover—others should be unwilling to extend help if they can get the benefits of reciprocity from someone else at lower cost. A solution to this problem is to develop relationships with individuals who have a stake in your welfare because they find you difficult to replace. An associate who finds you uniquely valuable—who gains benefits from you that would be difficult to find elsewhere—has incentives to invest in your recovery: to pull you through times of crisis, when others would abandon you as a poor credit risk. When a degree of irreplaceability gives an associate a stake in your welfare, that makes them one of the few people who would help you in a crisis; this gives you a stake in their welfare, which gives them an even bigger stake in your welfare, and so on—a virtuous circle that results in each partner being deeply engaged in the welfare of the other. Friendships are deep engagement relationships of this kind (Tooby & Cosmides, 1996; Hruschka, 2010). In this view, the motivations that create and sustain friendships—such as a desire to become uniquely valuable to one or a few individuals—evolved because they solved problems of crisis management. This implies that friendship jealousy will be most easily triggered by rivals who seem to have precisely those qualities that your best friend finds uniquely valuable in you.

Becoming uniquely valuable requires motivations to cultivate skills, positions of influence in a social network, or attitudes that are valued by a potential friend but difficult to find in others. This can include motivations to find and cultivate relationships with individuals who share your tastes or see the world as you do—a quality that Burkett (2009) calls "mental coordination." These individuals can be uniquely valuable as associates because they produce positive externalities for you. When they make the local social world conform more to their tastes, their actions make the world better for you as well; when disputes break out, they are more likely to interpret the situation as you do, have the same emotional reaction, and similar goals; they may be better than others at "reading your mind"—predicting your reactions and knowing what you would value. As expected, "like-mindedness" and similarity in attitudes is common in friendships. Indeed, people implicitly associate similarity in attitudes more with close friends than with kin (O'Gorman & Roberts, 2017), feeling "close" to someone predicts helping more in friends than in kin (Hruschka, 2010), and, consistent with friends having a stake in your welfare, brain imaging shows that sharing with a friend activates reward circuitry more strongly than sharing with a stranger (Hruschka et al., 2015).

In testing the banker's paradox model, Burkett (2009) asked American college students what qualities they found most uniquely valuable in their best friend. As expected, many answers reflected help in crisis management: they recognized that their best friend has a stake in their welfare, and would be there for them when they had a problem. But what qualities lead to this outcome? The most common answer referred to mental coordination—their best friend was "on the same wavelength", liked the same things, saw the world in the same way that they did.

There are two related, but somewhat independent, reasons to value mental coordination with a friend. One is that described above: mental coordination makes you uniquely valuable to your close friends, giving them a stake in your welfare such that you can count on them when times are bad. The second is that you spend more time doing things that you enjoy when your friend enjoys the same things. This raises a key question: What elicits the most jealousy: your best friend spending more time with a rival than with you, or your best friend developing greater mental coordination with the rival?

If mental coordination is a quality that makes a best friend uniquely valuable, then your friend developing mental coordination with a third party makes you increasingly replaceable. That is a threat to a valued relationship, which should evoke jealousy. Your friend spending time with a third party could itself be a cue that they are developing a close friendship, increasing the risk that you will be replaced. But the banker's paradox model predicts that your friend spending time with a third party will elicit less jealousy than discovering that they are developing greater mental coordination (see Krems et al., 2021 for a similar account).

In a series of vignette studies, Burkett (2009) found friendship jealousy was strongly correlated with feelings that one is being replaced, and both were strongly evoked when participants imagined situations in which their best friend was developing greater mental coordination with someone else (an effect that was significantly higher in magnitude for women more so than men). Similarly, losing time spent with the friend

also evoked jealousy, but less so than losing mental coordination. Following an evolutionary approach, it would be expected that a similar pattern of friendship jealousy should emerge in a novel population (Barkow et al., 1992).

In the present research, we conducted a replication of Burkett's (2009) work in Chile—a different country, continent, and language—to see if friendship jealousy is evoked by the perception that one's best friend is developing greater mental coordination with another person than with oneself. We tested three scenarios: (i) the best friend has less mental coordination with the rival than with you, but is spending more time with them; (ii) the best friend is developing more mental coordination with the rival than with you, but is spending more time with you; and (iii) the best friend is spending more time *and* developing more mental coordination with the rival.

## Method

### Participants and Procedure

We recruited a total of 305 Chilean participants for an online study (31% men), with a mean age of 24.5 years ( $SD = 8.0$ ), who reported mainly a heterosexual orientation (83%). There were no differences by sex in any of the demographics.

Participants were treated in accordance with the Ethical Principles of Psychologists and Code of Conduct (American Psychological Association, 2009). They completed individual questions about the number of close friends they had, and how jealous, trusting, and attractive they were (on a scale from 1-not at all, to 6-extremely). They completed a scale of attachment and social support (which are relevant variables in close friendships; Burkett, 2009), and then proceeded to respond to one of the friendship hypothetical scenarios, followed by a question about the amount of jealousy felt (on a Likert scale from 1-nothing at all to 5-extremely jealous).

### Friendship Hypothetical Scenarios

Each participant read one of three scenarios designed to manipulate the amount of time and mental coordination shared between the best friend and the interloper. These were Spanish translations of Burkett's scenarios.

Participants were told they would be reading scenarios about themselves and their same sex best friend. They were asked to imagine that they were actually experiencing the situations described in the scenarios.

The scenario below is an example from Burkett (2009, p. 62). The first paragraph describes cues of mental coordination; in this scenario, the best friend seems to share greater mental coordination with the rival than with you. The second paragraph describes how much time the best friend is spending with you versus the rival; in this example, the best friend is spending more time with you:

While you are out on Friday, you see your best friend talking and hanging out on campus with Dani, who is new in town. You learn that your best friend ran into Dani while she was going to class, and ever since she has been talking about how great Dani is, and how glad she is that they met. Over the next couple of weeks, you see that your best friend and Dani really click—they both enjoy doing the same things, and they have a great time together. At your best friend's suggestion, you, she and Dani go out for drinks. Your best friend keeps laughing with Dani about things you don't understand. When you look puzzled, they clue you in, but it is clear that they share a lot of private jokes. You can tell that your best friend talks to Dani about things she's upset about, and has told Dani things that she had previously told only to you. They are obviously on the same wavelength—other people have noticed that they even finish each other's sentences.

You and your best friend continue to hang out a lot. You go to movies, go to the gym together, and have a good time at parties. Your best friend still spends as much time with you as she ever did, but you realize that lately, when she needs advice or is upset and needs to confide in someone, she goes to Dani first. Recently, you overhear your best friend saying that she finds it so easy to talk to Dani when she has a problem—she says Dani seems to know when she is upset before she knows it herself.

This is the mental coordination with rival condition (mc with rival): the best friend's mental coordination with the rival is higher than yours, but she continues to spend as much time as ever with you. The other two

scenarios were closely matched, but the roles were switched. In the time with rival condition, your best friend is spending more time with your rival than with you, but has the greatest mental coordination with you. In the time plus mental coordination with rival condition (time + mc rival), your best friend is spending more time with the rival and shares greater mental coordination with them than with you.

## Measures

*Collins's Adult Attachment Scale Revised* (Fernández & Dufey, 2015) was used to assess three dimensions of attachment (closeness, dependence, and anxiety) with 6 items each. Responses are recorded on a Likert scale from 1 ("not at all characteristic of me") to 5 ("very characteristic of me"), and sample items are: "I find it relatively easy to get close to others", "I find that people are never there when you need them" (reverse coded).

Social Support was measured using the Martinez et al. (2014) scale, which evaluates the number of people that support an individual across six different situations (when needing help, feeling tense, etc.).

## Data Analysis

We used SPSS and JAMOVI to conduct the analyses and, based on Burkett's (2009) findings, we compared all the variables by sex. To assess the effect of the hypothetical scenario on jealousy, we first used an ANOVA with reported jealousy as the dependent variable and the three hypothetical scenarios as the between-subjects independent variable. Then we conducted two ANCOVAs entering attachment and social support measures as covariates.

## Results

Descriptive statistics, sex differences, and internal consistency for the scales are presented in Table 1. Men scored significantly higher than women in self-reported trust, and women reported significantly higher levels of attachment anxiety than men.

**Table 1**  
*Sex Differences on Self-Reported Measures, and Jealousy in Response to the Experimental Scenario*

Variables	Men <i>M</i> ( <i>SD</i> )	Women <i>M</i> ( <i>SD</i> )	<i>t</i>	<i>p</i>	<i>d</i>	<i>a</i>
Friends	4.28 (1.24)	4.18 (1.05)	0.746	.463	.09	
Jealousy (trait)	2.89 (1.25)	3.15 (1.39)	-1.610	.108	.20	
Trust	4.05 (1.32)	3.62 (1.26)	2.759	.006*	.34	
Attractiveness	3.12 (1.32)	3.15 (1.32)	-0.221	.830	.03	
Close	3.42 (0.69)	3.36 (0.73)	0.621	.535	.08	.66
Dependent	3.10 (0.78)	2.97 (0.79)	1.306	.193	.16	.74
Anxiety	2.70 (0.91)	3.04 (1.09)	-2.629	.009*	.33	.88
Support	4.37 (2.22)	4.53 (3.34)	0.411	.681	.05	.81
Jealousy (experimental)	2.45 (1.26)	2.75 (1.25)	-1.949	.052	.24	

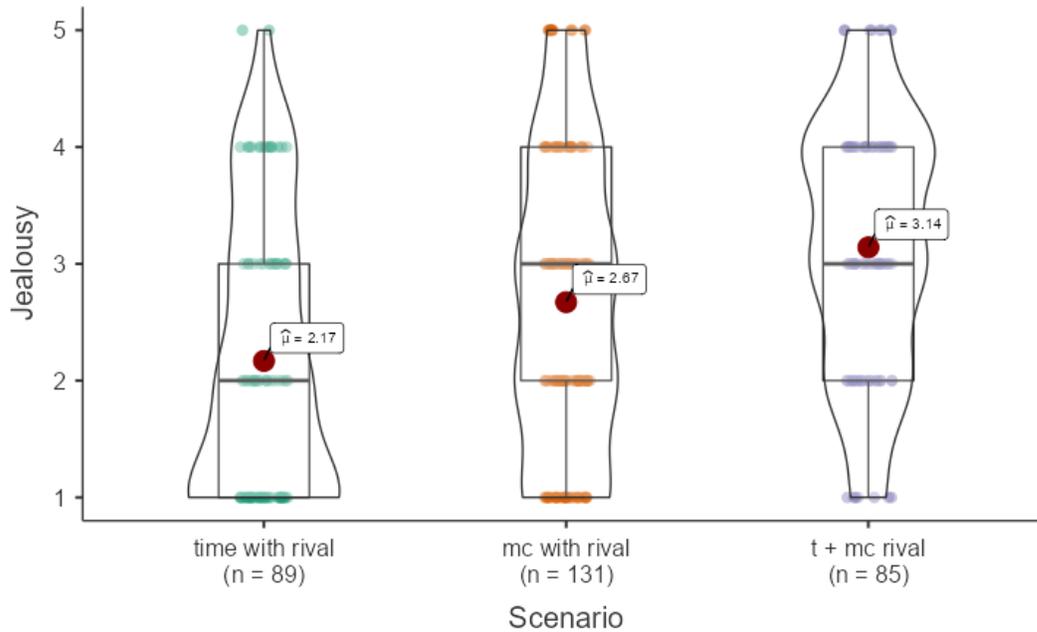
*Note.* Friends = number of close friends, Jealousy (trait) = self-reported jealousy, Trust = self-reported trust, Attractiveness = self-reported attractiveness. Close, Dependent and Anxiety are the dimensions of Collin's (1996) attachment scale. Support = number of people that support the individual. *M* and *SD* indicates the mean and standard deviation, respectively. *d* is Cohen's effect size value.

\*  $p < .05$ .

The ANOVA showed that friendship jealousy differed across scenarios ( $F(2,302) = 14.211, p < .001$ , partial  $\eta^2 = .09$ ), with an observed power of .99, indicating that a Type I error is possible but unlikely. Post hoc Tukey tests revealed that the lowest levels of jealousy were elicited by the time with rival scenario ( $M = 2.17, SD = 1.20$ ), which was significantly lower compared to the mc with rival jealousy ( $M = 2.67, SD = 1.26$ ,

$p = .007$ ,  $d = .8$ ), which was also lower than jealousy for the time + mc rival condition ( $M = 3.14$ ,  $SD = 1.11$ ,  $p < .001$ ,  $d = .4$ ). The largest difference was between time with rival and the time + mc with rival conditions ( $p < .001$ ,  $d = .8$ ), see Figure 1.

**Figure 1**  
*Friendship Jealousy for each Rival Condition*



*Note.* Jealousy levels evoked by each scenario (the dot reflects the median and the lines the quartiles.)

As Figure 2 shows, an ANOVA with condition and sex as between-subjects variables revealed main effects of condition and sex on friendship jealousy (with women reporting higher friendship jealousy for both mental coordination conditions than men,  $F(2,299) = 4.86$ ,  $p = .028$ , partial  $\eta^2 = .02$ ). There was no interaction between condition and sex ( $F < .94$ ).

A series of ANCOVAs revealed that initial self-reported jealousy ( $F(1,301) = 76.03$ ,  $p < .001$ , partial  $\eta^2 = .20$ ) and attachment anxiety ( $F(1,301) = 25.43$ ,  $p < .001$ , partial  $\eta^2 = .08$ ) were significantly related to friendship jealousy, but after controlling for these variables, differences in friendship jealousy remained significant in response to the conditions ( $F(4, 300) = 20.52$ ,  $p < .001$ , partial  $\eta^2 = .12$ ). None of the other variables had a significant effect on friendship jealousy.

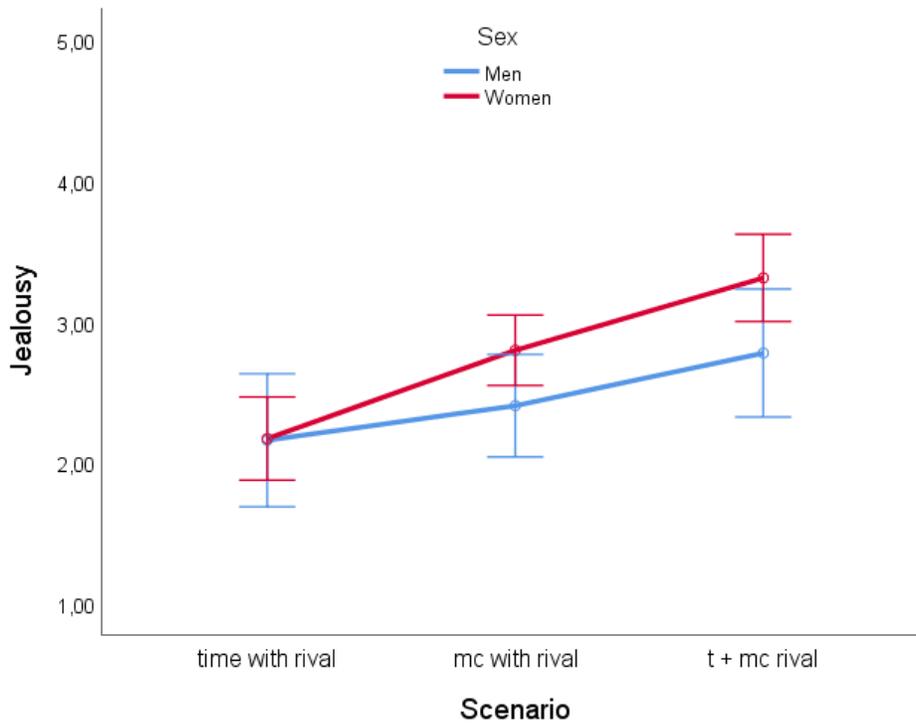
## Discussion

As hypothesized, we found that friendship jealousy was evoked more strongly by the threat of losing mental coordination with a friend than by just losing time spent with them. This replicates, in a different language, country, and continent, what Burkett (2009) found in the US.

We also found sex differences in friendship jealousy. Mental coordination with a rival increased jealousy in both sexes, but elicited more jealousy in women than in men. Time spent with a rival (without mental coordination) elicited similar levels of jealousy in both men and women. Burkett (2009) found this same pattern.

The amount of jealousy elicited by these scenarios did not vary with the participant's attachment dimensions, number of friends, trust, attractiveness, or social support. This suggests that friendship jealousy is elicited by factors that are specific to a given relationship.

**Figure 2**  
*Differences in Friendship Jealousy by Sex*



*Note.* The lines represent participant sex ( $n = 94$  men and 211 women) and the dots the level of friendship jealousy evoked by each scenario. Error bars portray the standard error.

Krems et al. (2021) conducted a series of studies investigating the functional design of friendship jealousy to see whether it features functions to prevent the loss of valued friends to other people. Like Burkett (2009), they found that feeling replaced is what drives this type of jealousy. They also reviewed comparative evidence across species, as well as different methods to assess and elicit friendship jealousy, concluding that cross-cultural research should complement their findings. To our knowledge, our results are the first to test friendship jealousy in a Spanish-speaking population, as well as in a country different from the US.

Regarding the limitations of our research, we must note that although we followed a similar recruitment procedure as Burkett (2009) and Krems et al. (2021), we worked with a convenience sample. This merits caution with the generalization of these results, as the participants were primarily young adults from WEIRD (western, educated, industrialized, rich, and democratic) populations. So, a logical future extension of our findings will be to study friendship jealousy in small-scale populations as well as using random sampling methods.

Nonetheless, following Tooby & Cosmides (1996), friendship jealousy appears to be a strategic adaptation designed to maintain and prevent desertion from close friends. As Burkett (2009) found, mental coordination is a route by which friends become uniquely valuable to one another, giving them a stake in each other's welfare. When a third party seems to be developing greater mental coordination with your friend, it makes you more "replaceable": it threatens the very quality that gives your friend a greater stake in your welfare. This risks losing key support in times of need. Therefore, friendship jealousy should be conceived as a normal emotion, designed to prevent friendship loss and motivate friend guarding (Krems et al., 2021).

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