

## Female intrasexual competition and reputational effects on attractiveness among the Tsimane of Bolivia

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### Abstract

This study, conducted among Tsimane women of Bolivia, investigates the relationship between reputational reports and ratings of individual attractiveness. Reputations are, at least in part, created and maintained through linguistic avenues between group members and are thus open to manipulation by others. Taking this into account, we hypothesized that individuals might have the ability to influence the attractiveness of others indirectly by influencing their reputations. The data collected among Tsimane women show that reporting positive or negative information about other group members significantly predicts the rankings of attractiveness assigned to those group members. We found that characteristics surrounding motherhood, trustworthiness, housekeeping abilities, social intelligence, and wealth or status to be the most influential reputational reports on attractiveness. We found that reports of promiscuity had no significant affect on perceived

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attractiveness. Overall, the results demonstrate that attractiveness ratings reflected a significant reputational component.

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## 1. Introduction

Several lines of evidence suggest that reputations are important to individuals living in social groups because they can mediate access to resources (Gurven, Allen-Arave, Hill, & Hurtado, 2000), determine reciprocal partners (Brown & Moore, 2002; Gurven, Allen-Arave et al., 2000; Gurven, Hill, Kaplan, Hurtado, & Lyles, 2000; Ostrom, 2003), and provide useful information to potential mates about health status (Henderson & Anglin, 2003), investment strategies (Campbell, 2002), and sexual fidelity (Hess & Hagen, 2002). Experimental evidence from economic games shows that people are more likely to cooperate and punish noncooperators when reputation effects are built into the design than when anonymity precludes reputation effects (Fehr & Fischbacher, 2004; Fehr & Rockenbach, 2003; Sigmund, Hauert, & Nowak, 2001).

Perceptions of physical attractiveness by self and others also appear to impact people's lives. Perceived attractiveness by others affects young children's social relationships and status (Boyatzis, Baloff, & Durieux, 1998; Maag, Vasa, Kramer, & Torrey, 1991) and a variety of outcomes as an adult, such as time spent with kin (Waynforth, 1999), self-income (Frieze, Olson, & Russell, 1991; Lynn & Simons, 2000; Roszell, Kennedy, & Grabb, 1989), income of spouse (Udry & Eckland, 1984), and occupational success for men and women in certain circumstances (Heilman & Saruwatari, 1979). While physical attractiveness may be most important in relationships with the opposite sex for reasons pertaining to health, pathogen resistance, and reproductive success (see Buss and Gangestad for reviews: Buss, 1989; Buss, 1998; Gangestad, 1993; Gangestad & Simpson, 2000; Gangestad, Thornhill, & Yeo, 1994), it also plays a role in same-sex relationships for both males and females (Gutierrez, Kenrick, & Partch, 1999; Joseph, 1985). Such same-sex effects only make sense if perceptions of physical attractiveness have effects on socially relevant outcomes. Women may care about the reputations of other women and utilize or manipulate information to change the perceptions of friends' and rivals' attractiveness to potential social network participants. These participants, made up of allies and opponents, may either help or inhibit access to real resources such as food, goods, mates, and friends. Indeed, there is evidence that perceptions of attractiveness may be affected by reputations regarding social behavior (Kniffin & Wilson, 2004) and social status (Townsend & Levy, 1990).

We propose that people integrate both physical and socially relevant information about other individuals in determining how to behave towards that person and in evaluating their desirability as a social partner. Mates, cooperators, friends, and enemies may be chosen by complex algorithms, based upon a wide variety of information that they may have regarding

that person's activities with respect to both physical characteristics and socially important variables, such as defections or faithfulness on social contracts, trustworthiness, social skills, access to resources, fidelity, intelligence, productivity, parenting skills, and general character. Such evaluations may be perceived as "attractiveness" or, at least, may affect perceptions of attractiveness. Reputation is vulnerable to manipulation particularly because it is maintained, at least in part, through linguistic avenues. Positive and negative reports about the social and physical characteristics of others might be employed strategically to affect social relationships among fellow group members and, therefore, indirectly with the actor.

In light of this, it seems worthwhile to consider and measure the relationship between reputation and perceived attractiveness among women. While there has been significant progress in understanding the determinants of physical attractiveness and its relationship to health and genetic quality (Grammer, Fink, Moller, & Thornhill, 2003; Simmons, Rhodes, Peters, & Koehler, 2004; Thornhill & Gangestad, 1993; Thornhill et al., 2003), much less is known regarding the extent to which social attributes and reputation might impact attractiveness and what components of reputation might be of greatest importance in assessments of attractiveness. This paper investigates the hypothesis that judgments of attractiveness are based not only on physical attributes, but are also composed of a variety of social and personal characteristics, including a reputational component, such that a person's rating reflects historical knowledge of their attitudes, beliefs, and past social behaviors.

Much of our information on reputation effects and perceptions of attractiveness are derived from people living in developed nations, especially undergraduate students. With some notable exceptions (Gurven, Allen-Arave et al., 2000; Price, 2003), we know very little about the determinants and effects of social reputations in traditional small-scale societies. Even less is known about the determinants and outcomes of physical attractiveness in those societies. One comparative study of attractiveness in traditional and modern society indicates both similarities and differences in the perceptions of attractiveness between small-scale societies and developed nations (Jones & Hill, 1993).

A better understanding of both reputation and attractiveness in small-scale societies is important for several reasons. First, human psychology regarding the formation of reputations and sensitivity to reputation effects is likely to have evolved in small groups, where life-long repeated interactions among individuals were the norm.

Second, physical attractiveness may be more closely linked to fitness in societies with high rates of infectious disease, high mortality, and high fertility. If physical attractiveness is an indicator of health (Gangestad, 1993; Gangestad & Simpson, 2000; Thornhill & Gangestad, 1993; Thornhill et al., 2003), it may be particularly important in mate choice and in the choice of long-term cooperative partners.

Third, individuals living in native communities, such as the Tsimane, who are the focus of this investigation, both produce their own food directly and acquire it indirectly through sharing in social networks. Reproductive success, especially among women, tends to be limited by access to resources. Cooperation between men and women, among men, and among women is a fundamental component of the human feeding niche and life history. Extensive food sharing, both among and within generations, is the norm in traditional foraging societies (Gurven, 2004b; Gurven, Hill, & Kaplan, 2002; Kaplan & Hill, 1985).

Cooperation among women is particularly important in high-fertility societies, where women must balance the competing tasks of childcare and food production.

Fourth, the flip side of extensive cooperation and mutual interdependence in small-scale societies is competition for access to socially mediated resources. For example, [Gurven, Hill, et al. \(2000\)](#) showed that among Hiwi foragers, meat distributions to other families only included, on average, 4 of 30 possible recipients. This selectivity in partner choice and sharing suggests that there may be significant competition for achieving the gains from social relationships. Women may compete for good cooperators and larger social networks. If they can alter their rivals' access to resources by altering the attractiveness of those individuals to others via reputational manipulation, they might be able to gain a relatively greater proportion of the limited resources in the environment (broadly defined). Preliminary data collected with Tsimane women are consistent with this view. Women report that the three most important sources of conflicts for them are (in order of decreasing importance) social relationships, mates, and food. The fact that social relationships cause the most conflict among women indicates the importance of cooperators and defectors in small-scale communities.

For these reasons, this study was designed to examine (1) whether assessments of personal characteristics affected judgments of women's attractiveness by other women in a native community, and (2) which characteristics are most related to attractiveness ratings. Given the above discussion regarding the ecology of small-scale subsistence societies, we chose to examine those reputational characteristics that are important to social, productive,

Table 1  
Questions asked to ascertain reputational reports: "Name three women that"

	Variable
Positive	
Have many things such (clothing, food and household things)	Wealthy
Make the best saraijs (hand woven bags)	Good weaver
Are powerful or influential	Powerful
Offer the best advice	Good advisor
Make the best chicha (alcoholic drink)	Good chicha
Are the hardest workers	Worker
Are good speakers	Communicator
Are good mothers	Good mom
Keep a clean house	Good housekeeper
Are humorous	Humorous
Negative	
Have the most unkempt or dirty children	Dirty kids
Know how to lie	Liars
Keep a dirty house	Bad housekeepers
Are mean	Mean
Are promiscuous	Promiscuous
Gossip about you	Gossiper
Are very shy	Shy

and mothering skills, such as information on who is a good mother, housekeeper, mate, friend, and social exchange partner (see [Table 1](#) for a list of characteristics).

The main hypothesis of this paper is that reputational information significantly affects reports of attractiveness within groups of people living in small-scale societies. More specifically, the prediction is that women would rank those women higher on attractiveness that they report upon positively and rank lower those who they report upon negatively. While not directly tested in this study, we also propose that women may compete with one another by altering reputations about others in their group in an effort to change the attractiveness of those individuals to potential social participants (i.e., mates or cooperators).

## 2. Methods

### 2.1. *Tsimane and the nature of the sample*

The Tsimane are South American Indians, numbering approximately 8000, who live in the tropical rainforest and moist savannas of the Beni region of Bolivia. They live in semiautonomous extended family groups within small villages, ranging in size from 60 to 400 individuals. The communities are relatively stable, and while there exists frequent movement between villages due to postmarital residence rules and migration, most women have extensive knowledge of the history of other women's behaviors in their community due to years of social interaction.

Tsimane subsistence consists of small-scale horticulture, fishing along a vast network of rivers and streams, hunting wild game in the dense forests, and gathering fruits and other resources from the natural environment. Wild game, such as paca, collared peccary, deer, and numerous monkey species, are hunted with bow and arrow and shotgun. The diet staples come from small family fields, including plantains, rice, sweet manioc, and corn, all of which are commonly used in the creation and fermentation of calorically dense types of traditional beer. Beer is prepared only by women, and a woman's ability and motivation to make beer are often cited as an important criterion of a good wife. Frequently, groups of women will make beer together and socialize throughout the lengthy process.

Women marry, on average, by age 16, have their first child by age 19, and have an average of seven births over their lifetime. Marriages are fairly stable, monogamous unions, although polygyny is not uncommon in many villages. Fidelity is very important to women, and the data that we have on conflicts indicate that infidelity causes significant social quarrels among women. Divorce is most common in first marriages before the birth of the first child. Postmarital residence is usually matrilineal until at least the first child is born, and then the new family may choose to move or stay. Women often prefer to stay when they have large, influential families, and thus, decisions about residence can be a source of conflict when husbands prefer to live closer to their own families.

For additional ethnographic background, we refer the reader to [Reyes-Garcia et al. \(2003\)](#).

## 2.2. *The study questionnaire*

Participants were 101 women, aged 14–70 years, living in four separate communities situated along the Maniqui, Cuverene, and Apere rivers. The four communities chosen for the study varied in their acculturation, proximity, and contact with the market economy outside Tsimane territory. The sample included 29 women from one of the more acculturated villages (acculturation based upon market, health, and social exchange with Bolivian nationals), 36 and 14, respectively, from moderately acculturated villages, and finally, 24 women from a village of very low acculturation (101 total women). They were asked to participate in a questionnaire regarding social and behavioral qualities of other women living in their area. Ideally, to determine whether women were attempting to manipulate the reputations and attractiveness of others, behavioral observation on gossiping patterns would have provided the advantage of measuring actual behavior rather than reported opinions. However, various obstacles prevented the witnessing of gossip and social aggression, such as linguistic, social, and operational barriers. For this reason, questionnaires were developed that attempted to simulate gossiping interactions and to determine each woman's evaluation of the personal characteristics of each other woman in her community.

Women were asked to point to photos of three women they thought to express certain positive or negative behavioral characteristics relating to mothering, housekeeping, and other important social skills. We selected characteristics that we thought would have a significant effect upon perceptions of attractiveness based on our many conversations about role responsibilities and mate criteria with Tsimane women and men, but that were also open to "opinion." [Table 1](#) lists the mixture of positive and negative reputational reports that women were invited to describe about others in their community. We predicted that positive reputational reports of Woman B by Woman A would result in significantly higher attractiveness rankings of Woman B by Woman A. Conversely, negative reputational reports of Woman B by Woman A should result in significantly lowered attractiveness rankings of Woman B by Woman A.

## 2.3. *Attractiveness measures*

To measure attractiveness, Polaroid photos were taken of all women in each community. After the questionnaire, women were asked to view Polaroids of pairs of women. Then, they were instructed to designate the more attractive of the two. The Tsimane words for the "most beautiful" were used in translation to indicate the choosing of the most attractive of the pair. After women indicated which of the initial pair was more attractive, the two photos were placed in ascending order. Subsequently, a new random photo was pulled from the pile and compared separately with the other two to determine if its placement was most attractive, least attractive, or in the middle. After this photo was placed in the order, another photo was chosen from the pile and its position also determined by pairing it randomly at first and directedly thereafter with others in the hierarchy. This random pairing of new photos with individual ones in the hierarchy was



repeated until all photos were eventually situated within the hierarchy from least to most attractive, given each interviewee's perspective.

#### 2.4. Data analysis

Attractiveness rankings were transformed into percentile rankings because rank order was not comparable across groups due to the different number of individuals in each study community. A linear mixed-effects model (MIXED procedure in SPSS) was used due to its unique ability to handle between-subjects effects with repeated observations, correlated data, and unequal variances. The repeated measures stem from the fact that each woman rated attractiveness and qualities of all other women in their community, as well as being themselves repeatedly rated by others. The MIXED procedure also allowed us to both determine whether there was an overall attractiveness effect for specific individuals (random effects) and whether particular individual reports on social and personal characteristics had an additional effect on those ratings.

We realize that any relationships found between reputational reports and attractiveness ratings are only statistical correlations and do not imply causation. For example, people often ascribe negative traits to people that they find unattractive, and positive traits to those that they find attractive (Bar-Tal & Saxe, 1974; Landy & Sigall, 1974; Lucker, Beane, & Helmreich, 1981; Tompkins & Boor, 1980). These 'halo effects' can confound the hypothesized relationship explored in this paper. To account for the potential bias of using attractiveness ratings from known women in each village, we collected independent attractiveness ratings for the women in two of our study villages by asking 11 men from another distant village to rate them using our same photos. These independent ratings therefore allow us, in a separate analysis, to examine the effect of reputational reports, after controlling for independent assessments of attractiveness for 48% of our total sample of women.

### 3. Results

Table 2 provides the parameter estimates and  $p$  values outlining the effects of the predictors listed in Table 1, upon which perceived attractiveness was regressed. For this analysis, two models are presented: a full model including all predictors, and a final reduced model that includes only the significant predictors. As might be expected, the age of the rated individual (Woman B) was negatively related to her attractiveness rating ( $p < .001$ ), and there were significant individual effects, with some women having an overall higher or lower average rating (not shown). Neither the age of the rater nor the interaction of rater's and rated's age significantly affected attractiveness; hence, these did not appear in the final model of reputational effects on reported attractiveness.

Wealth, social power, dirty children, bad housekeeping, and lying have the most significant effects on attractiveness, increasing (the first two) or decreasing (the latter three) the percentile attractiveness ranking by at least 5%. Other significant variables

Table 2  
Effects of reputational information on perceived attractiveness

	Full model				Final model			
	Estimate	S.E.	<i>t</i>	Significance	Estimate	S.E.	<i>t</i>	Significance
Positive variables								
Have many things (clothes, food, etc.)	6.76	1.72	3.94	.00	6.67	1.70	3.93	.00
Are powerful women	5.55	1.68	3.30	.00	5.55	1.67	3.32	.00
Are good speakers	4.09	1.69	2.43	.02	4.06	1.68	2.42	.02
Are hard workers	4.07	1.73	2.35	.02	3.85	1.71	2.24	.03
Are good mothers	4.00	1.88	2.13	.03	3.79	1.87	2.02	.04
Make the best saraijs (woven bags)	3.34	1.70	1.97	.05	3.04	1.68	1.81	.07
Offer the best advice	2.78	1.70	1.63	.10	2.58	1.69	1.52	.13
Make the best chicha	-2.54	1.79	-1.42	.16	-	-	-	-
Are humorous	0.41	1.68	0.24	.81	-	-	-	-
Keep a clean house	-0.53	1.72	-0.31	.76	-	-	-	-
Negative variables								
Have the most unkempt children	-9.82	1.88	-5.22	.00	-9.73	1.88	-5.19	.00
Keep a dirty house	-4.96	1.72	-2.89	.00	-4.96	1.70	-2.86	.00
Know how to lie	-4.77	1.72	-2.77	.01	-4.75	1.72	-2.77	.01
Gossip about you	-3.67	1.83	-2.01	.04	-3.81	1.81	-2.10	.04
Are very shy	-3.10	1.64	-1.89	.06	-3.16	1.64	-1.94	.05
Are mean	-2.64	1.73	-1.52	.13	-2.77	1.73	-1.61	.11
Are promiscuous	-1.57	1.70	-0.92	.36	-	-	-	-
Control variable								
Age of rated woman (B)	-0.65	0.04	-17.36	.00	-0.66	0.04	-17.95	.00

( $p < .05$ ) included being a good communicator, a hard worker, and a good mother as positive predictors of attractiveness, and being reported as shy and a gossip as negative predictors. Being a good weaver, offering good advice, and being mean approached significance in the predicted direction. Being known as a good chicha (beer) maker, promiscuous, a good housekeeper, or humorous were each in the predicted direction, but were insignificant and fell out of the final model.

Most relevant for assessing a causal relationship between reputation and attractiveness is whether reputation parameters remain significant after controlling for an independent assessment of the physical attractiveness of women, using ratings of half of the women in our sample done by 11 men from a distant community. Table 3 compares regression analyses before and after controlling for men's rankings of women. Women's attractiveness ratings are strongly correlated with men's ratings, but this relationship does not reduce the reputational effects described above. In fact, all of the significant effects remain significant, and with similar magnitude, after controlling for the men's attractiveness ratings. Thus, even after controlling for an unbiased measure of attractiveness, positive and negative reputational



Table 3

Comparison of reputation effects before and after controlling for separate male rankings of female attractiveness

	Women only		Controlling for male ranking	
	Parameter estimate	Significance	Parameter estimate	Significance
Positive variables				
Are powerful women	8.07	.00	5.12	.03
Have many things	6.41	.01	10.86	.00
Are hard workers	4.35	.08	5.92	.01
Are good speakers	8.01	.00	7.22	.00
Keep a clean house	–	–	–	–
Are good mothers	–	–	–	–
Offer the best advice	–	–	–	–
Negative variables				
Gossip about you	–7.62	.01	–7.59	.00
Are promiscuous	–3.83	.13	–3.38	.16
Keep a dirty house	–7.16	.01	–4.38	.08
Know how to lie	–3.69	.16	–	–
Have the most unkempt children	–11.13	.00	–7.53	.01
Are very shy	–7.87	.00	–7.77	.00
Control variable				
Age of rated woman (B)	–0.83	.00	–0.17	.02
Male attractiveness reports			0.57	.00
	$R^2$	.18	$R^2$	.25

effects have a significant impact on female assessments of attractiveness for the women in their community.

#### 4. Discussion

Perceptions of attractiveness are related to a series of physical and behavioral factors among Tsimane women. As one might expect, younger women were considered most attractive, with rankings being strongly negatively associated with age. In addition to those physical characteristics, social and other personality attributes were also significantly related to attractiveness and together account for half of the variation in attractiveness as age alone (as measured by adjusted  $R^2$ ). Our results show that opinions about mothering behaviors, social intelligence, trustworthiness, and wealth or status were the most significant predictors of perceived attractiveness. Due to the social nature of the human niche, it is appropriate that women would find good mothers and smart women with wealth, prestige, and honest behaviors as attractive social partners and those with negative reputations for these characteristics as less attractive social partners.

As predicted, positive and negative information had positive and negative effects on attractiveness rankings, respectively. “Having unkempt children” had the largest impact on attractiveness. Perhaps, having dirty children is a good indicator of other important reproductive success variables, such as number of helpers, size of social networks, mothering

skills, or health status, all of which may impact productivity and inclusive fitness. However, it may be also that having unkempt children is associated with lowered health and thus lowered physical beauty of the mother, making them difficult to tease apart.

We found that negative homemaking qualities significantly affected attractiveness, but positive ones did not. It does seem counterintuitive that bad housekeeping had an effect where good housekeeping did not, but we interpret this result to mean that there are consequences for overtly poor housekeeping, but not for average or excessive housekeeping. A similar argument has been made about generosity, where only negative deviations from norms of generous giving can hurt one's reputation (Gurven, Allen-Arave et al., 2000).

The variable "humor" was also predicted to increase attractiveness reports, but it was not significantly related to ratings. We offer several possible explanations for this result. First, as a result of sexual selection, humor may be a trait that women prefer more in males (Miller, 2000) and, thus, may be unrelated to female judgments of female qualities and attractiveness. Another explanation is more complex and deals with culturally and contextually specific humor. Among Tsimane women, humor can take a variety of forms. Some humor is general and not socially directed, while other types of humor can be socially motivated and targeted at specific individuals. Because much humor in Tsimane groups revolves around making fun of others, and laughing at their expense, we found that perception of the question seemed to vary and often was perceived as "knowing how to make fun of others." In this context, some women might report the names of others who make fun of them or those in their social network who make fun of mutual enemies. Thus, it was found that being named as "humorous" was slightly correlated with being both "desired as a friend" and someone who "gossips about you behind your back."

Promiscuity was predicted to decrease perceived attractiveness, but here was found to be insignificant, albeit in the predicted direction. This was somewhat surprising, because indicators of fidelity can be important to potential mates, and women's reputations have been hypothesized to be particularly vulnerable to such manipulation (Hess & Hagen, 2002). One possible explanation of this finding is related to age effects. In the Tsimane sample, a label of promiscuity was restricted almost exclusively to younger, unmarried women. Younger women are perceived, by virtue of their age, as significantly more physically attractive, and thus, even controlling for age, this variable may be outweighed by physical characteristics. Another possibility is that promiscuity may be less important to attractiveness rankings made by women than those made by men due to paternal uncertainty. Nevertheless, we acknowledge that women may be expected to compete for those attributes that men desire and, hence, should be keenly aware of attributes, such as promiscuous sexual activity and fidelity of their rivals.

It is also interesting to note that residence patterns are related to reputational ratings. Some attributes, such as being a good mother and other homemaking qualities, are associated with distance between houses, with mothers, other household family members (both consanguineal and affinal kin), and neighbors being more likely to be named as women possessing positive homemaking qualities. Conversely, those living further away are more often named as having unkempt children. This would seem to indicate that

strategic alliances and residential choices are related. Consistent with this idea, no woman was chosen by every other woman for any characteristic. There was great variety in who was designated as possessing specific behavioral attributes, suggesting that, in addition to individual qualities per se, each woman maintains her own network of allies and competitors and ascribes attributes to them accordingly.

## **5. Conclusion**

While these results show that ratings of personality and other social characteristics predict ratings of attractiveness, further research is needed to understand how verbal and nonverbal behavior is used in day-to-day life to manipulate reputations and affect social relationships. The extent to which information is derived from direct observation and from linguistic communication is likely to vary from characteristic to characteristic. For example, knowing who is promiscuous, who gossips about you, and who is a liar are probably more rarely observed and more often made known only through linguistic reports. The fact that the variable ‘gossips about you’ negatively predicts attractiveness ratings probably means that women are aware that gossip is a strategic tool in social interaction.

Anecdotal observations and discussions with informants suggest that gossip plays a pivotal role in relationships among Tsimane women and men. Many of the arguments and conflicts that we recorded between women concerned gossip. Men often claim that they receive much of their information through their wives, and the women’s gossip network sometimes mediates relations between men, who often avoid direct forms of confrontation (Gurven, 2004a). For example, one man reported that he learned through his wife (who was told by her sister) that his brother-in-law was complaining about his lack of contribution to the extended family food supply.

This study raises a series of new questions for future research. How can linguistic behavior be used to manipulate relationships among women? How truthful must comments be for them to be believed and to maintain one’s reputation as a source of good information? What are the organizing principles governing cooperation and competition among women? What factors determine the attributes that are the subject of women’s conversations and about which comments are made? In what contexts and to whom are such comments made? What are the resources over which women compete and ally? Do their verbal remarks actually affect strategic alliances and competition between women sufficiently to impact the resources at their disposal? How do women’s perceptions about the attractiveness of other women affect their behavior towards them?

There are also a host of comparative questions about male–female differences in this arena. Virtually all of the above questions could be asked about men’s relationships with one another and about the causes and consequences of similarities and differences among men’s and women’s intrasexual social relationships. There is much to be learned from further research into the relationships among verbal interaction, perceptions of physical attractiveness, cooperation, and competition and into how such relationships vary by sex and socioecology.

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