

Numeric cognition among speakers of the Jarawara language  
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Jarawara is an Arawá language spoken by approximately 170 people and documented extensively in Dixon (2004). Dixon suggests that the language contains no native number terms beyond verbal forms signifying “be one” and “be two” (2004:559). This assertion implies that Jarawara is one of the most extreme documented cases of a language with a paucity of number terms (Hammarström 2010), and helped to motivate an investigation into the numeric cognition of its speakers. Investigations among speakers of languages with few number terms have proven useful to linguists and other cognitive scientists interested in the language-cognition interface (see De Cruz & Pica 2008). For instance, it has been demonstrated that speakers of Pirahã, an Amazonian language that is putatively numberless, face difficulties when performing basic tasks related to numeric cognition (Gordon 2004, Frank et al. 2008, Author in press). In order to contrast the numeric cognition of the Jarawara with those of the Pirahã, and in so doing shed light on the interaction between a numeric language and thought, we replicated three of the basic tasks described in Author (in press, under review), Gordon (2004) and Frank et al. (2008), among members of the two main Jarawara villages. These three tasks are a one-to-one matching task, a hidden matching task, and an orthogonal matching task. (See Gordon 2004 for descriptions.) Unlike speakers of Pirahã, the seven speakers of Jarawara tested generally performed quite well on the tasks in question. Differences between the two tribes were significant (at  $p < 0.001$ ) according to two-tailed t-test contrasting speakers’ proportions of correct responses, for all three tasks. At first glance, these results would appear to cast doubt on the strong relativistic claims made in Gordon (2004), since the Pirahãs’ poor performance in that study was attributed to their lack of number words. Significantly, however, during the course of our experimental work we discovered that the Jarawara *do* have a native cardinal number system, contra Dixon (2004), and that this system can be used for numerosities as large as twenty. Jarawara speakers subsequently claimed that the number system has been in use for generations, as evidenced by a traditional tally-mark system that is based on the number words in question.

Along with the experimental data presented, this paper represents the most extensive documentation to date of a number system in an Arawá language. The numbers for 1-20, corroborated independently by the Jarawara speakers, are presented. The Jarawara system is a relatively uncommon binary type (rather than the crosslinguistically-predominant decimal and vigesimal systems, see e.g. Heine 1997), with the word *fama* (‘pair’) serving as a recurring base for many numbers beyond two, e.g. *famafama* (‘4’). The number (*yehe*) *kahari* (‘5’), which optionally includes the word *yehe* (‘hand’), serves as a base for numbers 6-9, for example (*yehe*) *kahari famamake* (‘7’) and (*yehe*) *kahari famafamake* (‘9’).

The results of this study suggest that, unlike another isolated Amazonian hunter-gatherer tribe (the Pirahã), the Jarawara excel at various tasks of numeric cognition. Crucially though, their heightened performance could be explained, at least in part, by the existence of a native number system in their language. The findings presented are consistent with the simple conclusion that the native number system of the Jarawara, documented here, may facilitate in crucial ways the numeric cognition required for basic quantity recognition tasks.

## References

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