

ADDRESSING THE PROBLEM OF GRANULARITY IN PRIMATE GESTURE RESEARCH

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A primary obstacle in primate communication research is determining whether a set of examples (*tokens*) constitutes a single communicative signal (*type*). This issue of *granularity* is of particular relevance to primate gestural communication. Reports of species' gestural repertoires vary between studies, likely due to differences in granularity of gesture definitions. We discuss the implications of granularity on primate gesture research: too fine a granularity causes overestimation of gesture types and idiosyncrasy, while too coarse a granularity causes underestimation of types and increased commonalities. We argue that granularity may be assessed and standardized by taking gesture meaning into account: the granularity of non-idiosyncratic gesture types is more likely to be accurate if the gestures have particular meanings. We applied a meaning-based assessment to gesture tokens of 28 orangutans (*Pongo pygmaeus* and *Pongo abelii*) housed in 3 European zoos. We grouped gesture tokens (N=1344) into types by physical similarity and used apparently successful tokens to predict meanings for each type. Seventy percent of the common types (N=38) corresponded to a single meaning 70%-100% of the time. The granularity of the other types was re-examined and six gestures were subsequently combined or divided to increase specificity. We tested all predicted gesture meanings by analyzing gesturers' actions following responses that did not match their gestures' meanings. When recipients responded "incorrectly," gesturers were more likely to persist ($\chi^2=63.35$, $P=0.001$). Our results show how gesture meaning can be used to assess granularity and how meanings can be validated through observing violation of the gesturers' expectations.

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