

# The *-IN* GRID: A Mathematical Order in Language by Way of Tagalog Verb Phrases

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In papers and lectures since 1995 I have proposed, as a mathematician turned lexicographer, that there is an underlying mathematical order in Tagalog ruled by quadrisections. The idea derives from not one but two instances of the same perfect 2x2 permutation—an elementary mathematical construction—manifesting in the play of roots and affixes of Tagalog verb phrases (VPs): This mathematic surfaces morphologically, in the first case, in the way our verbs express exactly four different time aspects; and semantically in the other, in the way the seven affixes of Tagalog VPs actually subdivide our verbs into four basic verbal actions.

The two quadrisections suggest a repeating combinatorial structure underlying our verb-building. I sought evidence of it, first, in VPs of the *-um-* affix, and then in those of the *mag-*. The results were inconclusive, failing to resolve the very large database into well-defined, self-evident grammatical sets, which was my objective.

The evidence, as it turns out, was waiting elsewhere, but nearby: in the VPs of the *-in* affix. Shifting over, an order quickly emerges, matching all expectations. The quadrisections are surer and the resulting order unmistakable, evincing an underlying mathematical process.

The paper will report the results for the first time.

It will be demonstrated how a large random sample of Tagalog verb phrases may be progressively quadrisectioned to reveal a well-defined and symmetrical network, what appears to be a grid, of cognitive and linguistic contrasts, lying at the core of our language-building.

The method used is empirical and distributional. I take a large set of Tagalog VPs and progressively quadrisection it into smaller and smaller subsets of similar verbs. At each stage a different similarity or dissimilarity is brought to light so distinguishing the VPs in ever increasing detail until they are resolved into distinct grammatical sets.

Seven quadrisections of the grid are laid out. A database of more than a thousand *-in* VPs with nuanced English translations is used from the fourth quadrisection on to demonstrate the method. Four successive quadrisections are performed on the database, systematically subdividing it into 128 distinct, grammatical sets (=43x2, only half of the fourth quadrisection is explored).