2007 European Summer Meeting of the Association for Symbolic Logic: Logic Colloquium '07
Source: *The Bulletin of Symbolic Logic*, Vol. 14, No. 1 (Mar., 2008), pp. 123-159
Published by: Association for Symbolic Logic
Stable URL: http://www.jstor.org/stable/40039618

► JOHN CORCORAN, *Aristotle's many-sorted logic*.

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As noted in 1962 by Timothy Smiley, if Aristotle's logic is faithfully translated into modern symbolic logic, the fit is exact. If categorical sentences are translated into many-sorted logic *MSL* according to Smiley's method or the two other methods presented here, an argument with arbitrarily many premises is valid according to Aristotle's system if and only if its translation is valid according to modern standard many-sorted logic. As William Parry observed in 1973, this result can be proved using my 1972 proof of the completeness of Aristotle's syllogistic.

MSL Using Sortal Variables

The ranges of the Sortal variables are all non-empty. In the examples, ess ranges over spheres, pee over polygons.

Every sphere is a polygon.	$\forall s \exists p\; s = p$
Some sphere is a polygon.	$\exists s \exists p\; s = p$
No sphere is a polygon.	$\forall s \forall p\; s \neq p$
Some sphere isn't a polygon.	$\exists s \forall p\; s \neq p$

MSL Using Range-Indicators with General (Non-Sortal) Variables

Each initial variable occurrence follows an occurrence of a quantified range-indicator or "common noun" that determines the range of the variable in each of its occurrences in the quantifier's scope. To each range-indicator, a non-empty set is assigned as its "extension". In the example, the extension of ess is the spheres, pee the polygons.

For every sphere x, there exists a polygon y such that $x = y$.	$\forall \mathrm{S}x \exists \mathrm{P}y\ x = y$
For some sphere x, there exists a polygon y such that $x = y$.	$\exists \mathrm{S}x \exists \mathrm{P}y\ x = y$
For every sphere x, for every polygon y, x isn't p.	$\forall \mathrm{S}x \forall \mathrm{P}y\ s \neq y$
There exists a sphere x such that, for every polygon y, x isn't y.	$\exists \mathrm{S}x \forall \mathrm{P}y\ x \neq y$

Many-sorted logic with range-indicators and non-sortal variables was pioneered by Anil Gupta in his 1980 book. Also see my *Logical form of quantifier phrases: quantifier-sortal-variable* this BULLETIN, vol. 5 (1999) pp. 418–419.