What part of ‘no’ don’t you understand?

Some thoughts on Negative Quantifiers

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The goal of this short article is to present a novel idea that both Universal Quantifier and Existential Quantifier can be reduced to a Negative Quantifier.

In mathematics, only Universal Quantifiers and Existential Quantifiers are traditionally used. There are even special symbols for this: ∀ (a vertically inverted “A”) and ∃ (a vertically inverted “E”).

The letter **A** stands for **A**ll and the letter **E** stands for **E**xists.

When describing natural language, semanticists actually use more than just these two quantifiers. In English, quantifiers may compound with other words.

Universal Quantifier: everyone, everything, everywhere, …

Existential Quantifier: someone, something, somewhere, …

Negative Quantifier: noone, nothing, nowhere, …

Interestingly, we can derive the other quantifiers from the negative one. But first we need a symbol for the Negative Quantifier. For this I suggest we use a vertically inverted **N** . (Luckily it isn’t hard to find on the keyboard, since an inverted **N** is also written **N**.)

N*x* P(*x*) means “there is no *x* such that P(*x*)”.

Both the Universal Quantifier ∀*x* and the Existential Quantifier ∃*x* can be defined in terms of **N***x* in the following way:

(1) ∀*x* P(*x*) = **N***y* **N***x* P*(x)*

(2) ∃*x* P(*x*) = **N***x* **N***y* P*(x)*

Of course, the variable *y* must be free in P(*x).*

$\forall x$ and $\exists x$ are no longer elementary.

A Regular Negation likewise can be expressed in terms of a Negative Quantifier **N***x:*

(3) ¬P(*x)* = **N***y* P*(x*)

As is well know, all other logical connectives can be expressed in terms of Conjunction and Negation. Assuming that pre-linguistic intelligence (Margaliot, 2017) already has Conjunction, adding Negative Quantifier **N** immediately gives us all the other quantifiers as well as all of the logical connectives.

References

Margaliot, Sasson 2017 “Minimalist Semantics and Pre-Linguistic Intelligence”, lingbuzz/003409