

Refutation of the sliding scale theorem in law

© Copyright 2018 by Colin James III All rights reserved.

Abstract: The sliding scale theorem, and as implemented in fuzzy logic, is refuted.

We assume the method and apparatus of Meth8/VL4 with Tautology as the designated *proof* value, **F** as contradiction, **N** as truthity (non-contingency), and **C** as falsity (contingency). Results are a 16-valued truth table in row-major and horizontal, or repeating fragments of 128-tables for more variables.

LET p, q ; first element, second element, r, s ;
 \sim Not; $+$ Or; $\&$ And; $>$ Imply, greater than; $<$ Not imply, lesser than;
 $=$ Equivalent; $@$ Not Equivalent;
 $\#$ necessity, for all or every; $\%$ possibility, for some or one;
 $(s@s)$ zero, 0; $(\%s\>\#s)$ one, 1.

From: Kirgis, F. L. (2002). Fuzzy logic and the sliding scale theorem.
[law.ua.edu/pubs/lrarticles/Volume 53/Issue 2/Kirgis.pdf](http://law.ua.edu/pubs/lrarticles/Volume%2053/Issue%202/Kirgis.pdf)

"The sliding scale theorem may be simply stated: The greater the degree to which one element is satisfied, the lesser the degree to which the other need be." (1.0)

We rewrite Eq. 1.0 as an implication.

If one element is satisfied as greater than the second element, then the second element is satisfied as lesser than the first element. (1.1)

$(p>q)>(q<p)$; **FTTF FTTF FTTF FTTF** (1.2)

Remark: If Eq. 1.1 is rewritten to include the relation of "greater than or equal to" and "lesser than or equal to", then Eq. 1.2 is $\sim(q<p)>\sim(p>q)$ with the same truth table result.

"Under fuzzy logic, zero and one are simply the opposite ends of a continuum ..." (2.0)

We rewrite Eq. 2.0 as a relation to include one element and the second element.

The sum of one element with a second element is greater than or equal to zero and lesser than or equal to one. (2.1)

$\sim((p+q)<(s@s))\&\sim((\#s\>\%s)>(p+q))$; **TFFF TFFF TFFF TFFF** (2.2)

We combine Eqs. 1.0 and 2.0 to capture the intention of the author as 1.0 implying 2.0. (3.0)

If one element is satisfied as greater than the second element, then the second element is satisfied as lesser than the first element, this implies the fuzzy sum of one element with a second element is greater than or equal to zero. (3.1)

$$((p \supset q) \supset (q \supset p)) \wedge (\sim((p \wedge q) \supset (s @ s)) \wedge \sim((\#s \supset \%s) \supset (p \wedge q))) ;$$

F T T F F T T F F T T F F T T F

(3.2)

Eqs. 1.2, 2.2, and 3.2 as rendered are *not* tautologous. Hence the sliding scale theorem, and as implemented in fuzzy logic, is refuted.