

# Refutation of the innovation contest in two sequential stages

© Copyright 2019 by Colin James III All rights reserved.

**Abstract:** We evaluated the definition of the conjectured model for the innovation contest in two sequential stages as *not* tautologous, forming a *non* tautologous fragment of the universal logic VL4.

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). The 16-valued truth table is row-major and horizontal, or repeating fragments of 128-tables, sometimes with table counts, for more variables. (See ersatz-systems.com.)

LET  $\sim$  Not,  $\neg$ ; + Or,  $\vee$ ,  $\cup$ ,  $\sqcup$ ; - Not Or; & And,  $\wedge$ ,  $\cap$ ,  $\sqcap$ ,  $\cdot$ ,  $\otimes$ ; \ Not And;  
 $>$  Imply, greater than,  $\rightarrow$ ,  $\Rightarrow$ ,  $\mapsto$ ,  $>$ ,  $\supset$ ,  $\rightarrow$ ;  $<$  Not Imply, less than,  $\in$ ,  $<$ ,  $\subset$ ,  $\prec$ ,  $\neq$ ,  $\ll$ ,  $\leq$ ;  
 $=$  Equivalent,  $\equiv$ ,  $:=$ ,  $\Leftrightarrow$ ,  $\leftrightarrow$ ,  $\hat{=}$ ,  $\approx$ ,  $\simeq$ ; @ Not Equivalent,  $\neq$ ,  $\oplus$ ;  
 $\%$  possibility, for one or some,  $\exists$ ,  $\diamond$ , **M**; # necessity, for every or all,  $\forall$ ,  $\square$ , **L**;  
 $(z=z)$  **T** as tautology, **T**, ordinal 3;  $(z@z)$  **F** as contradiction,  $\emptyset$ , Null,  $\perp$ , zero;  
 $(\%z\>\#z)$  **N** as non-contingency,  $\Delta$ , ordinal 1;  $(\%z\<\#z)$  **C** as contingency,  $\nabla$ , ordinal 2;  
 $\sim(y < x)$  ( $x \leq y$ ), ( $x \subseteq y$ ), ( $x \sqsubseteq y$ );  $(A=B)$   $(A\sim B)$ .

Note for clarity, we usually distribute quantifiers onto each designated variable.

From: Bimpikis, K.; Ehsani, S.; Mostagir, M. (2019). Designing dynamic contests. Operations Research. 67:2:295-597. [43 pages in preprint]. [gsb.stanford.edu/sites/gsb/files/publication-pdf/contests.pdf](http://gsb.stanford.edu/sites/gsb/files/publication-pdf/contests.pdf)  
[kostasb@stanford.edu](mailto:kostasb@stanford.edu), [shayane@stanford.edu](mailto:shayane@stanford.edu), [mosta@umich.edu](mailto:mosta@umich.edu)

**1. Introduction** Innovation contests are a tool that firms and institutions use to outsource innovation to the crowd. ...

**2. Model** Our benchmark model is an innovation contest with two sequential stages, A and B, and two competitors, 1 and 2. Innovation happens if an agent successfully completes Stage A and then Stage B. Stage A is associated with a binary state  $\theta_A$  that describes whether that stage can be completed ( $\theta_A = 1$ ) or not ( $\theta_A = 0$ ). If  $\theta_A = 0$ , then Stage A is not feasible (and, consequently, innovation is not possible). If  $\theta_A = 1$ , then the breakthrough to complete Stage A is feasible and has an arrival rate that is described by a Poisson process with parameter  $\lambda$ . .. (2.1.1)

**Remark 2.1.1:** We take 0 and 1 to be **F** and **T** due to the verbiage “binary state  $\theta_A$  that describes whether that stage can be completed ( $\theta_A = 1$ ) or not ( $\theta_A = 0$ ).”

LET  $p, q, r, s:$   $\theta, A, B, s.$

$$((p\&q)=((s=s)+(s@s)))>(((p\&q)=(s=s))>r) ;$$

TTTT **F** TTTT TTT**F** TTTT (2.1.2)

**Remark 2.1.2:** If Eq. 2.1.2 takes ordinal 1 to be **N**, then the result diverges farther from **T**:

$$(((p\&q)=(\%s\>\#s))+((p\&q)=(s@s)))>(((p\&q)=(\%s\>\#s))>r) ;$$

NNNC TTTT NN**C** TTTT (2.1.3)

Eqs. 2.1.2 and 2.1.3 as rendered are *not* tautologous, hence refuting the conjectured model of innovation contest in two stages.