Refutation of Dempster-Shafer belief and plausibility theory

Abstract: We evaluate Dempster-Shafer belief and plausibility functions. Three definitions are *not* tautologous. This refutes Dempster-Shafer belief and plausibility theory.

We assume the method and apparatus of Meth8/VŁ4 with Tautology as the designated *proof* value, **F** as contradiction, N as truthity (non-contingency), and C as falsity (contingency). For results, 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 p, q, r, s: P, bel(ief) or support, pl(ausibility), A;
~ Not, ¬ ; + Or, ∨, ∪; - Not Or; & And, ∧, ∩; \ Not And;
> Imply, greater than, →, ⊢, ↦; < Not Imply, less than, ∈;
= Equivalent, ≡, ⊨, :=, ⟺, ↔; @ Not Equivalent, ≠;
% possibility, for one or some, ∃, ◊, M; # necessity, for every or all, ∀, □, L;
(z=z) T as tautology; (z@z) **F** as contradiction, ∅, Null;
(%z<#z) C as contingency, Δ, ordinal 1;
(%z>#z) N as non-contingency, ∇, ordinal 2;
~(y < x) (x ≤ y), (x ⊆y).

From: en.wikipedia.org/wiki/Dempster–Shafer_theory

Belief and plausibility functions:

bel(A)<=P(A)<=pl(A) (1.1)

~((r&s)<(~(p&s)<(q&s)))=(p=p) ; TTTT TTTT TTTT T**FFF** (1.2)

pl(A)= (1-bel(~A)) (2.1)

(r&s)=((%s>#s)-(q&~s)) ; NNTT NNTT NNNN CCCC (2.2)

bel(A)<=P(A)<=(1-bel(~A)) (3.1)

~(((%s>#s)-(q&~s))<(~(p&s)<(q&s)))=(p=p) ;
TTTT TTTT TNNN TNNN (3.2)

Dempster-Shafer generalization of Bayesian theory:

LET p, q, r, s: B, bel(ief) or support, pl(ausibility), A

If (A And B)=Null, then bel(A Or B)=bel(A) Or bel(B). (4.1)

((s&p)=(s&s))>((q&(s+p))=((q&s)+(q&p))) ;
TTTT TTTT TTTT TTTT (4.2)

Remark 4.2: Because we show elsewhere that Bayes' theorem is *not* tautologous, we expect Dempster-Shafer, as *no*t tautologous from Eq. 3.2, to be an equivalence.

Eqs. 1.2-3.2 as rendered are not tautologous. This refutes Dempster-Shafer theory as plausibilty and belief functions.