Refutation of the paradox of Hempel's raven

Abstract: We evaluate the hypothesis which is *not* tautologous and hence *not* a paradox. It forms a *non* tautologous fragment of the universal logic VŁ4.

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). 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 ~ 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, ⊤, ordinal 3; (z@z) **F** as contradiction, Ø, Null, ⊥ , zero;
(%z>#z) N as non-contingency, Δ, ordinal 1; (%z<#z) C as contingency, ∇, ordinal 2;
~(y < x) (x ≤ y), (x ⊆ y), (x ⊑ y); (A=B) (A~B).
Note for clarity, we usually distribute quantifiers onto each designated variable.

From: en.wikipedia.org/wiki/Raven_paradox

Hempel describes the paradox in terms of the hypothesis: ..

(1) All ravens are black. (1.1.1)

In the form of an implication, this can be expressed as:

If something is a raven, then it is black. (1.2.1)

Remark 1.2.1: We write Eq. 1.2.1 as:

If raven, then black. (1.3.1)

LET p, q, r, s: black, green apple, raven, s.

r>p ; TTTT **F**T**F**T TTTT **F**T**F**T (1.3.2)

Via contraposition, this statement is equivalent to:

(2) If something is not black, then it is not a raven. (2.1.1)

Remark 2.1.1: To map via contraposition, we write Eq. 2.1.1 as:

If not black, then not raven. (2.2.1)

~p>~r ; T**F**T**F** TTTT T**F**T**F** TTTT (2.2.2)

In all circumstances where (2) is true, (1) is also true—and likewise, in all circumstances where (2) is false (i.e., if a world is imagined in which something that was not black, yet was a raven, existed), (1) is also false. (2.3.1)

Remark 3.1.1: We write Eq. 2.3.1 in two parts as:

If Eqs. 2.2.2 is true, then 1.3.2 is true; (2.4.1)

(~p>~r)>(r>p) ; `TTTT TTTT TTTT TTTT` (2.4.2)

and if 2.2.2 is false, then 1.3.2 is false. (2.5.1)

~(~p>~r)>~(r>p) ; `TTTT TTTT TTTT TTTT` (2.5.2)

(((~p>~r)=(s=s))>((~p>~r)=(s=s)))&(((~p>~r)=(s@s))>((~p>~r)=(s@s))) ;
`TTTT TTTT TTTT TTTT` (2.4.2)

Given a general statement such as *all ravens are black*, a form of the same statement that refers to a specific observable instance of the general class would typically be considered to constitute evidence for that general statement. For example,

(3) *My pet raven is black.* (3.1.1)

is evidence supporting the hypothesis that *all ravens are black*.

Remark 3.1.1: Eqs. 1.3.1 and 3.1.1 are equivalent.

The paradox arises when this same process is applied to statement (2). On sighting a green apple, one can observe:

(4) *This green apple is not black, and it is not a raven.* (4.1.1)

(q>~p)&(q>~r) ; TTT**F** TT**FF** TTT**F** TT**FF** (4.1.2)

By the same reasoning, this statement is evidence that (2) *if something is not black then it is not a raven.* (5.1.1)

((q>~p)&(q>~r))>(~p>~r) ; TTTT **F**TTT TTTT **F**TTT (5.1.2)

Remark 5.1.2: Eq. 5.1.2 is *not* tautologous to mean 4.1.2 is *not* evidence of 2.2.2.

But since (as above) this statement is logically equivalent to (1) *all ravens are black*, it follows that the sight of a green apple is evidence supporting the notion that all ravens are black.

(((q>~p)&(q>~r))>(~p>~r))>(r>p) ;
TTTT TT**F**T TTTT TT**F**T (6.1.1)

This conclusion seems paradoxical because it implies that information has been gained about ravens by looking at an apple.

Remark 6.1.1: Eq. 6.1.1 is *not* tautologous, and it does *not* imply that information was gained about ravens by looking at an apple. Hence the hypothesis is *not* a paradox.