Refutation of the paradox of Hempel’s raven

© Copyright 2019 by Colin James III  All rights reserved.

Abstract: We evaluate the hypothesis which is not tautologous and hence not a paradox. It forms a non tautologous fragment of the universal logic VL4.

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.)

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 FFF TTTT FFF (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 ; TTTT TTTT TTTT 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. 

... 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,

\[(3) \text{My pet raven is black.}\] 

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:

\[(4) \text{This green apple is not black, and it is not a raven.}\] 

\[((q \rightarrow \neg p) \land (q \rightarrow \neg r)) ; \quad \text{TTTF TFFF TTTF TFFF} \] 

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

\[(((q \rightarrow \neg p) \land (q \rightarrow \neg r)) \rightarrow (\neg p \rightarrow \neg r) ; \quad \text{TTTT FTTT TTTT FTTT} \] 

**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.

\[(((q \rightarrow \neg p) \land (q \rightarrow \neg r)) \rightarrow (\neg p \rightarrow \neg r)) \rightarrow (r \rightarrow p) ; \quad \text{TTTT TFTT TTTT TTFT} \] 

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.