**Explanandum**: That to be explained

**Explanans**: That which explains

**Deductive-Nomological (DN) Model of Explanation**

* Explanation is a deductive argument where the conclusion is the explanandum and the premises are the explanans.

*True* DN explanations must fulfil[[1]](#footnote-1):

1. Explanans deductively entails explanandum
2. Explanans includes at least one general law
3. Explanans must be empirically verifiable
4. Explanans must be true

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| **DN Explanation of Particular Fact** | **DN Explanation of General Law** |
| P1) An object remains at rest or remains in motion at a constant speed in a straight line, unless acted upon by a force. (Newton’s first law)P2) An apple falls from an apple tree, directly above where Newton is standing.C) The apple hits Newton on the head. | P1) Newton second lawP2) Newton’s third lawC) Law of conservation of linear momentum |
| General law explanations can be trivial:P1) General Law #1 AND General Law #2C) General Law #1 |

**What are General Laws?**

* What distinguishes *genuine* laws from accidental regularities?

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| **General Laws** | **Accidental Regularities** |
| Newton’s three laws (all objects) | Everyone in this room is shorter than 7 feet |
| Kepler’s laws of planetary motion (all planets in solar system) | No coin in my pocket is a quarter  |

**Proposal #1**: General Laws support counterfactuals; Accidental Regularities do not

* ASSERTABLE: If Bambaruush[[2]](#footnote-2) (a planet outside the solar system) is in the solar system, it would obey Kepler’s laws.
* UNASSERTABLE: If Yao Ming is in this room, he would be shorter than 7 feet.

**Proposal #2**: General Laws support modal statements; Accidental Regularities do not

* Newton’s laws imply impossibility of violation
* Accidental regularities do not imply impossibility of violation

Problem with proposals #1 and #2 is that they beg the question:

* Question: what distinguishes general laws from accidental regularities?
* Begged Answer: general laws support counterfactuals and modal statements, accidental regularities do not.

**Proposal #3**: Accidental Regularities have limited scope; General Laws do not

* Newton’s laws have unlimited scope; regularity about people in this room is of limited scope.
* Problem: intuitive laws like Kepler’s also have limited scope.
* Salmon’s suggestion: distinction between basic laws (e.g., Newton’s laws) and derived laws (e.g., Kepler’s laws).
* Salmon claims that accidental regularities are *not* derivable from basic laws (p.20). But why not?
* P1) Basic laws AND all people in this room are shorter than 7 feet.
* C) All people in this room are shorter than 7 sheet.

[**Woodward and Ross (2021)**](https://plato.stanford.edu/entries/scientific-explanation/#BasiIdea): “Finding an adequate characterization of lawhood is thus an ongoing issue for the *DN* model.”

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| **DN is insufficient for explanation** | **DN is unnecessary for explanation** |
| Intuitive explanationP1) Sun’s position + flagpole’s heightP2) General law about lightC) Shadow’s lengthUnintuitive explanationP1) Shadow’s length + flagpole’s heightP2) General law about lightC) Sun’s position | How To Stop Your Cat From Knocking Things Off Your Counter - YouTubeIntuitive explanationP1) The cat tipped the bottle C) The bottle is on the groundScriven: This explanation is correct, but it does not appeal to any general law!Hempel: The general laws are implicit premises! |

**Deductive-Statistical (DS) Model of Explanation**

* Same as DN, except that statistical law instead of general law

**Inductive-Statistical (IS) Model of Explanation**

* Same as DS, except that argument is inductive rather than deductive
* Explanandum is some particular fact that is highly probably given the explanans

EXAMPLE:

P1) 99% of covid infections are mild

P2) Bob is infected with covid

C) Bob’s covid infection is mild

|  |  |
| --- | --- |
| **IS is insufficient for explanation** | **IS is unnecessary for explanation** |
| P1) 95% of covid patients who drink coconut water recover quicklyP2) Bob is infected with covid and drank coconut waterC) Bob recovered quickly from covidThe problem is that 95% of patients recover quickly even without coconut water. | Intuitive explanationP1) 25% of untreated syphilis become paresisP2) Bob has untreated syphilisC) Bob has paresisThe problem is that explanandum given explanans is not highly probably. |

**Statistical-Relevance (SR) Model of Explanation**

* Unlike DN or IS, SR is not an argument
* Unlike IS, SR involves statistical relevance rather than high probabilities

P(R|C): probability of quick recovery (R) from covid for some reference class (C)

P(R|C.T): probability of quick recovery (R) for some reference class (C) given treatment (T)

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| --- | --- |
| P(R|C.T) > P(R|C) | Treatment is positively relevant |
| P(R|C.T) < P(R|C) | Treatment is negatively relevant |
| P(R|C.T) = P(R|C) | Treatment is irrelevant |

* Suppose P(R|T.C) > P(R|C)
* What explains Bob’s quick recovery?
* SR’s explanation is that Bob received treatment.
* Problem with SR is that statistical relevance =/= causal relevance.
* Just by chance, any purported treatment can be positively or negatively relevant.

**Gems and Coals**

 Well-structured.

 Clearly written.

 Not much discussion about what constitutes a statistical law.

**References**

Salmon, W.C., (1999). "Scientific Explanation," pp. 7-41 of Ch. 1 in *Introduction to the Philosophy of Science*. Salmon, M.H. (Ed.), Englewood Cliffs, NJ: Prentice Hall.

Woodward, J. and Lauren R., (2021). "Scientific Explanation", The Stanford Encyclopedia of Philosophy, Edward N. Zalta (ed.), <https://plato.stanford.edu/archives/sum2021/entries/scientific-explanation>

1. *Potential* DN explanations fulfill 1-3 but not necessarily 4. [↑](#footnote-ref-1)
2. “Bambaruush” means bear cub 🧸 in Mongolian. [↑](#footnote-ref-2)