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On the Axiomatisation of the Natural Laws — A Compilation of Human Mistakes Intended to Be Understood Only By Robots

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Abstract

This is an attempt to axiomatise the natural laws. Note especially axiom 4, which is expressed in third order predicate logic, and which permits a solution to the problem of causation in nature without stating that "everything has a cause". The undefined term "difference" constitutes the basic element and each difference is postulated to have an exact position and to have a discrete cause. The set of causes belonging to a natural set of dimensions is defined as a law. This means that a natural law is determined by the discrete causes tied to a natural set of dimensions. A law is defined as "defined" in a point if a difference there has a cause. Given that there is a point for which the law is not defined it is shown that a difference is caused that connects two points in two separate sets of dimensions.

Keywords: Natural laws, Axiomatisation, Causality, Objects.

1. Undefined terms

1. ρ
2. σ
3. Difference
4. Dimension
5. Relation
6. Element
7. Cause
8. Point
9. Belongs to
10. Existence

2. Initial definitions

- *a set = df A specific existence of elements (in this extraction defined by occurrence within brackets ({})).*
- *a complex of dimensions = a field of dimensions = df A set of dimensions.*
- *D = df A specific and limited set of dimensions.*
- *π = df The cause of ρ on σ.*
- *θ = {σ, ρ, π} = df*

  1. *A specific π that causes a specific ρ on a specific σ,*
  2. *the specific ρ that is caused by the specific π in 1. and*
  3. *the specific σ mentioned in 1.*

- *D_{km} = df A specific and limited field of dimensions; {d_k, d_{k+1},..., d_m}, in which d is a separate dimension and D_{km} contains m-k+1 dimensions.*
- *form = df A specific set of relations.*
- *Ξ = df The form of θ.*
- *elements of relation = df Parts of a structure of relations necessary to define a form.*
- *Π, P and Σ = df The elements of relation of Ξ; where Π represents the relations of π, P the relations of ρ and Σ the relations of σ.*

3. Axioms

Axiom 1: ρ is a difference

Axiom 2: σ is a difference

Axiom 3: ρ belongs to D_{km}, a specific and limited field of dimensions

Axiom 4: In all points X belonging to an arbitrary D, Ξ is true.

4. The object Ω

- *Ω = df*

  1. *{ρ_1, ρ_2,..., ρ_i},*
  2. *in which each and every ρ_x ($1 \leq x \leq i$) constitutes a difference towards {ρ_1, ρ_2,..., ρ_{x-1}}, and where*
  3. *ρ_{x+1} constitutes a difference towards {ρ_1, ρ_2,..., ρ_{x-1}, ρ_x}.*

5. π:s relation to D

θ implicates an unique cause π to each and every ρ. For a specific and limited field of dimensions D_{km} therefore, a precise set of causes λ is tied to included ρ. This specific set causes the total set of ρ in D_{km}. Each and every ρ in D_{km} therefore can be explained with the set λ. Why ρ_{x+1}, for instance, is answered with π_x.

> *Definition of the law λ*
>
> *λ = df $\{\pi_0, \pi_1,..., \pi_q\}$, in which each and every π_x causes a ρ_{x+1} belonging to the set $\{\rho_1, \rho_2,...,\rho_q,\rho_{q+1}\}$ which constitutes the total amount ρ in a specific and limited field of dimensions (D_{km}).*

From the definition above follows theorem 5 and theorem 6.

> *Theorem 1: (Not part of this compilation.)*
>
> *Theorem 2: (Not part of this compilation.)*
>
> *Theorem 3: (Not part of this compilation.)*
>
> *Theorem 4: (Not part of this compilation.)*
>
> *Theorem 5: λ_{km} causes all ρ in D_{km}.*
>
> *Theorem 6: Every ρ caused by a certain law λ_x exists in a limited and specific complex of dimensions D_x.*

6. Inter-relations of laws λ

> *Definition of D_n*
>
> - *D_n = df The field of dimensions $\{d_1, d_2,..., d_f,..., d_g,..., d_{n-1}, d_n\}$,$1 \leq f \leq g \leq n$ that contains;*
>
>   1. *all ρ_x belonging to D_{fg},*
>   2. *all ρ_y that can form Ω for ρ_x and*
>   3. *all ρ_z that ρ_x can constitute Ω for.*
>
> *Definition of Λ of D_n*
>
> - *Λ = df $\{\lambda_1, \lambda_2,..., \lambda_P\}$, where P is the total amount of laws applying in D_n and where $\{\lambda_1, \lambda_2,..., \lambda_P\}$ causes all ρ belonging to D_n.*

Another definition concludes this section:

> - *initiating difference = df σ*

7. Definition of "λ defined in a point X_0"

With Λ and its part-laws λ each and every difference related to Ω (ρ) has a cause π belonging to Λ. Assume a point X_0 belonging to D_{km} belonging to D_n. What "λ_{km} is defined in X_0" means is defined below.

> *Definition of λ defined*
>
> - *λ_{km} is defined in a point X_0 belonging to D_{km} = df θ is true in X_0.*
> - *Theorem 7: If λ_{km} is defined in X_0, Λ is defined in X_0*
> - *Theorem 8: If Λ is defined in X_0, λ_{km} is defined in X_0*

A special case is at hand when for a point X_0 holds {¬σ, ¬ρ, ¬π}. Is in this case λ_{km} defined in X_0? Since λ_{km} does not exist in X_0 (¬π is true and π is λ:s representative in X_0), λ_{km} is neither defined nor not defined in X_0. Thus the next theorem applies:

> *Theorem 9: If for a point X_0 holds {¬σ, ¬ρ, ¬π} λ_{km} for the point is neither defined nor not defined.*

Before going further some new concepts are introduced:

> - *effect = df ρ*
> - *a point of effect = df A point X in whichρ is true.*

From the two definitions above follows:

> *Theorem 10: In a point of effectθ is true.*

8. Beyond θ

Either the state of things is such that it is not possible that θ does not apply in each point where π apply, or it is not impossible. If the latter is the case something not of Λ bound can emerge in a point. Arbitrariness though, in that case, is not imminent, nor chance, due to axiom 4: "*In all points X belonging to an arbitrary D,Ξ is true"* (Ξ = *df The form of*θ). This implies that if a law for a point is defined in that point Ξ apply and if the law is not defined Ξapply:

> *Theorem 11: Ξ is true in all points X_0 whether or not λ(X_0) is defined.*

Ξ,"the form of θ", does not include chance because the form implicates a cause to each difference. Therefore the following is valid:

> *Theorem 12: It is not true for any point that effect can occur by chance.*

9. Derivation and definition of ρ' and ~ρ

> *Λ not defined in X_0*

Assume Λ is not defined in a point X_0. This implicates according to the definition of "λ defined" that θ is not true in X_0. For X_0 then the following is true:

(1) ¬θ

θ has three elements for which thus apply "not":

(2) ¬{σ, ρ, π}

(2) implicates that at least one element of θ is negated:

> *Theorem 13: ¬θ ⇒ i) {¬σ, ρ, π} ⋁ ii) {σ, ¬ρ, π} ⋁ iii) {σ, ρ, ¬π} ⋁ iv) {¬σ, ¬ρ, π} ⋁ v) {¬σ, ρ, ¬π} ⋁ vi) {σ, ¬ρ, ¬π} ⋁ vii) {¬σ, ¬ρ, ¬π}*

According to theorem 9 Λ is neither defined nor not defined in a point X_0 where vii) is true, therefore vii) is not true in X_0.

Again ¬π implicates a cause-less difference [iii) and v)] and also a cause-less negation of difference [vi)]. Furthermore ¬σ implicates that a cause of a difference has emerged at random [i)] respectively a cause of a negated difference emerging at random [iv)]. When a cause-less difference or negation of difference is equal to chance i), iii)-vi) implicates chance. Since axiom 4, by theorem 12, does not permit chance i), iii)-vi) are not true in X_0. ¬ρ finally implicates negation of difference [ii)].

¬θ then implicates seven alternatives of which six are not possible. Then the seventh, ii) {σ, ¬ρ, π}, is true:

> *Theorem 14: If Λ is not defined in a point X_0 {σ, ¬ρ, π} is true in that point.*

10. Of P in X_0 where Λ is not defined

Theorem 14, though, does not show how Ξ:s elements of relation are fulfilled when it is lacking a fulfilment of P. Axiom 4 implicates that P is fulfilled in X_0. Thus P is fulfilled in X_0.

> *Theorem 15: If Λ is not defined in a point X_0 then holds for X_0: {σ, ¬ρ, π} ⋀ P is fulfilled.*

P is not fulfilled by the ρ that is negated (ρ), nor by the negation of it (¬ρ). That which fulfils P in X_0 can be called ρ'.

> *Definition of ρ': ρ' = df That which fulfils P in a point X_0 for which Λ is not defined.*

11. Dimensionality

In X_0 ¬ρ is true. Since $X_0 \in D_n$ ρ' can not belong to D_n, nor is it possible that the point which ρ' belongs to, belongs to D_n.

> *Theorem 16: The point that ρ' belongs to, does not belong to D_n.*
>
> *Definition of X'_0 = df The point that ρ' belongs to.*

Here a hypothesis will be introduced, in which it is assumed that ρ' exists in the dimensions D_n symbolises with the addition of some more, separating it from D_n:

> *Hypothesis 1: ρ' exists in a complex of dimensions with the n dimensions of D_n plus ω numbers of dimensions, ω ∈ N, ω>0.*
>
> *Definition of D': D' = df The complex of dimensions that ρ' belongs to.*
>
> *Theorem 17: $D_n \in D'$.*

12. New laws

Λ does not apply in X_0. In spite of that ρ' is caused for X_0 (in X'_0). With this, one could say that Λ' determines ρ'. The specific law that applies in X_0' can be called λ'_1. Also π did not cause ρ'. The cause of ρ' can be called π'.

> *Definition of π': π' = df The cause of ρ'.*
>
> *Definition of λ'_1: λ'_1 = df The law that the cause of ρ' belongs to.*

> *Definition of Λ': Λ' = df The law-domain that contains λ'_1.*

13. The cause of ρ'

Since ρ' does not belong to D_n it cannot exist in X_0. Therefore there are two points to be considered though they are connected. For the pair of points X_0-X_0' holds:

> *#1 {σ, ¬ρ, ρ', π}*

σ and π on the other hand cannot belong to X'_0, since they belong to D_n.

In X'_0 there is ρ'. According to axiom 4 in X_0' there also has to be more elements. Axiom 4 states that the cause and condition of effect have to be found in the point of effect. Therefore cause and condition of effect is part of #1. Since only ¬ρ is not occupied as an element of relation it has the quality of the two missing elements of X_0'. Thus ¬ρ is part of X_0'. For not violating logical rules of dimensions, namely that what is part of D_n cannot be identical to that which is part of D' ≠ D_n, ¬ρ in D_n is not identical to that of D'. ¬ρ in X_0' can be called ~ρ ("denied" ρ).

14. ~ρ as a set

Because π' and ~ρ are elements, not for instance numbers, the relation between the two can be formulated as a relation between sets. Then the one is an element of the other. Since π' definitely is one:

> *Definition of ~ρ: ~ρ = df The representation of ¬ρ in X'_0*
>
> *Theorem 18: In X'_0 ~ρ is cause and condition of ρ'.*
>
> *Theorem 19: (Not part of this compilation).*
>
> *Theorem 20: σ' ∈ ~ρ*
>
> *Theorem 21: π' ∈ ~ρ*
>
> *Definition of σ': σ' = df What fulfils the relations of Σ in X'_0*

Therefore:

X_0: {σ, ¬ρ, π}

X'_0: {σ', ρ', π'}

> *Theorem 22: (Not part of this compilation.)*
>
> *Theorem 23: (Not part of this compilation.)*
>
> *Theorem 24: (Not part of this compilation.)*
>
> *Theorem 25: (Not part of this compilation.)*
>
> *Theorem 26: (Not part of this compilation.)*
>
> *Theorem 27: (Not part of this compilation.)*

Finally a theorem that sums up some aspects of the theory so far:

> *Theorem 28: If Λ is not defined in a point X_0 {σ, ~ρ, ρ', π} is true.*

15. The concept Θ

If Λ is not defined in a point X_0 belonging to D_n, P for X_0 is shifted to D', a complex of dimensions separated from D_n. P in D' is called ρ'. This implicates an existence of something with association to ¬ρ, ~ρ. The cause of ρ', π', in turn, belongs to ~ρ.

For X_0-X'_0 holds according to theorem 28: {σ, ~ρ, ρ', π}. In a point X'_1, separated from X'_0, and belonging to D', the case is: {σ, π, ρ}, that is, θ. Between D_n and D' {σ, ~ρ, ρ', π} is true, a state of facts below symbolised Θ.

> *Definition of Θ: Θ = df {σ, ~ρ, ρ', π}.*

That Θ can be true is the result of the present study.

> *Theorem 29: (Not part of this compilation.)*
>
> *Theorem 30: (Not part of this compilation.)*
>
> *Theorem 31: (Not part of this compilation.)*

16. Axiom(s) of existence

> *Axiom of existence 1: There is at least one point for whichΘ is true.*

17. Conclusion

Given this extraction something exists in two separate sets of dimensions. Extrapolating this finding we have a new perspective on quantum entanglement (Bub 2020). If a set of quantum particles pair wise are joined by what has been labelled "Θ:s" they would be entangled. It would also be interesting to investigate "interfaces" between separate sets of things (Gamper 2017) using the concept of "Θ".

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