0.1. Formal Argument Against Intellectual Property

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1. 1. Purpose of the Formal Argument

I propose to question the justification of intellectual property based on a formal reasoning that establishes concepts of "good", "use", "authority", "property" and "abundance", among others. The formal system is structured by means of definitions and axioms that, together and with some premises, attempt to demonstrate solidly (solid deductive argument) that the assignment of exclusive property rights (especially in the context of abstracted ideas or properties) leads to contradictions when considering goods that are abundant (i.e., susceptible of being used simultaneously by different agents).

The strategy of the argument is to carry out a **reduction to the absurd**. It starts from an assumption, called the "statist assumption", in which it is stated that there is at least one good (for example, an ideal or idea) that is abundant and, at the same time, exclusive property is assigned to some subject. It is then shown that, by assuming an abundant good, it follows that it is impossible -in modal terms- for exclusive ownership to exist, since exclusivity requires conditions (such as rivalry of use and normative authority) that cannot be met in shared goods. By generating this contradiction, the possibility of justifying intellectual property in such cases is formally rejected.

1. 2. Detailed Analysis of Definitions and Axioms

0.1. Symbology and Notation

Before analyzing each axiom, it is important to explain the notation used:

- \equiv : Used as a definition symbol, which should read "is defined as".
- \diamond : Modal operator of possibility, used to express that "it is possible that...".

The basic predicates and functions are:

- Abundant(y): *y* is abundant; that is, it can be used or controlled by two or more agents simultaneously.(Axiom 7).
- Good(x) = x is a good (See Axiom 3).
- Use(x,y,E) = x exercises control/use over y for the purpose E.
- ExclusiveControl(x,y) = x exercises exclusive control over y; i.e., x has the ability to prevent others from using y. (See Axiom 5)
- Ownership(x,y) = x owns y, and is defined in terms of exclusive control. (Axiom 6)
- Authority(x,y,n): x possesses normative power over y (i.e., the ability to decide, permit, or exclude the use of y by others) by norm n (or justified by norm n); it is understood as the ability to decide, permit, or exclude the use of y by others.
- TeoriaEtica(T): T is an ethical theory, understood as a consistent subset of the total set of norms that has, in addition, a model that validates its norms (Axiom 8).
- ConflictAvoidance(n,T): The norm *n* of theory *T* aims at avoiding conflicts.
- Norm(n): n is a norm (or axiom) of T-theory.
- Conflict(n, m): n conflicts with m.
- Rival(y): y is a rival; that is, it is defined as that good for which it is impossible (in the modal sense) for two different agents to use it simultaneously for given purposes.

, *and* being a good, it is impossible (in the modal sense) for two distinct subjects x and z to make simultaneous use of the same good. That is to say, in a rival good, the exclusive use of one subject excludes the possibility that another also uses it.

10. Objective of Conflict Avoidance in Ethical Theories.

 $\forall T (TeoriaEtica(T) \land \forall n \in T AvoidConflicts(n,T)).$

Every rule of an ethical theory T aims at avoiding conflicts.

11. Existence of Norms from Normative Authority or Normative Power.

 $\forall x, y, n, T Authority(x, y, n) \rightarrow \exists n \exists T(Norm(n) \land EthicalTheory(T) \land n \in T.$

The intention is to establish that the exercise of authority over a good must be able to be linked to the existence of norms within an ethical theory. That is, authority implies a normative basis in T.

12. Origin of Conflicts in Rival Goods.

 $\forall n \in T, x, y \ (AvoidConflict(n, T) \rightarrow (Authority(x, y, n))) \leftrightarrow Rival(y)).$

If every norm n of an ethical theory T aims at avoiding conflicts (and by Axiom 10 it does), then it is the case that x has normative authority over y if and only if y is a rival good.

13. Incompatibility of Conflicting Norms in an Ethical Theory.

 $\forall n, T Norm(n) \land Ethical Theory(T) \land n \in T \land \neg (Conflicting(n, n)).$

This axiom imposes that no norm contained in an ethical theory can be in conflict with itself; that is, Conflict(n,n) cannot occur. This condition is fundamental to guarantee the internal consistency of the normative system.

1. 3. Statement of the Argument (Reduction to the Absurd).

1.(Statist assumption) $\exists y \exists x Abundant(y) \land (Property(x,y) 2.$

2. $\forall x, y \text{ Abundant}(y) \rightarrow \neg \Diamond (\text{Property}(x, y))$

(Justification)

2.1 (Statist assumption) $\exists x \neq z \exists y \exists E1 \exists E2$ (Property(y) \land Use(x,y,E1) \land Authority(x,y) \land Use(z,y,E2)) (Assumption that there exists a property which can be used by different agents simultaneously and at least one subject has authority over it).)

2.2 \forall T (TeoriaEtica(T) $\land \forall$ n \in T AvoidConflict(n,T)) (Axiom 10).

 $2.3 \forall n \in T, x, y \ (AvoidConflicts(n,T) \rightarrow (Authority(x,y,n))) \leftrightarrow Rival(y))) \ (Axiom \ 12).$

2.4 ∴ $\forall n \in T, x, y \text{ (Authority}(x, y, n))) \leftrightarrow \text{Rival}(y)))$ (Modus Ponens of 2.2 with 2.3)

2.5 ∀n∈T,x≠z,y Well(y) ∧ (Use(x,y,E1) ∧ Use(z,y,E2)) → ¬ \Diamond (¬ \Diamond (Use(x,y,E) ∧ Use(z,y,E))) (Non-Contradiction Principle).

2.6 $\therefore \neg \Diamond$ (Rival(y)) (Application of Definition 8, Modus ponens with 2.1 and with 2.5).

2.7 : \neg (Authority(x,y,n)) (Modus Ponens with 2.1, 2.2, 2.3 and 2.5).

 $2.8 \div \neg \Diamond$ (Property(x,y) (Application of Definition 5, which implies authority and rivalry, both of which are impossible in this case).

3... Property(x,y) $\land \neg \Diamond$ (Property(x,y) (Reducing to absurdity by 1 and 2) 4.

To avoid contradiction, one denies the contradictory part of the assumption, and is left with the logical conclusion:

 $3 \therefore \neg \Diamond (Property(x,y))$

0.1. 3.1 Contextualization and Step-by-Step Argument Development

0.0.1. 3.1.1.1 Initial Hypothesis and Statist Assumption Fundamental Premise (Step 1):.

 $\exists y \exists x A bundant(y) \land (Property(x,y)).$

• Explanation:

The "statist assumption" assumes the existence of at least one abundant good y over which

there exists a subject x who, according to the definition of property, has exclusive control of y. Since "Ownership(x,y)" is defined as ExclusiveControl(x,y), the assumption implies that x has both exclusive use and normative authority over y.

0.0.1. 3.1.2 Denial of Possibility of Ownership in Abundant Property Statement:.

 $\forall x, y \ Abundant(y) \rightarrow \neg \Diamond (Property(x, y)).$

• Interpretation:

This statement, which one wishes to derive, holds that if a good y is abundant, it is impossible (in modal terms) for there to exist a subject x who is entitled to exclusive ownership of y. The contradiction will be reached by showing that the "statist assumption" (of Step 1) and the actual situation of an abundant good are incompatible.

 Strategy of Demonstration (Reduction to the Absurd):** **. The hypothesis opposite to the expected conclusion will be assumed and we will proceed to derive a contradiction, so as to reject the existence of a subject with property over an abundant good.

0.0.1. 3.1.2 Development of Reasoning through Intermediate Steps (2.1 to 2.8)

The argument uses a series of inferences (numbered 2.1 through 2.8) to show how the hypothesis of an appropriable abundant good leads to a logical contradiction. Each of these steps is explained below:

• 2.1 Multiple Use Hypothesis:.

 $\exists x \neq z \exists y \exists E1 \exists E2 \ (Good(y) \land Use(x,y,E1) \land Authority(x,y) \land Use(z,y,E2)).$

• Explanation:

In this step it is assumed (as part of the statist assumption) that there exists a good y which, being good (by the Definition of Good), is used by two distinct agents: x (which also has normative authority over y) and z (for which only use is assumed, without requiring that z has normative power).

• 2.2 Normative Goal Assertion:.

 $\forall T (TeoriaEtica(T) \land \forall n \in T AvoidConflict(n,T)).$

• Explanation:

This statement reiterates Axiom 10, which states that in any ethical theory the goal is to avoid conflict. This premise is the basis on which normative authority will be related to rivalry (see Axiom 12).

• 2.3. Relationship between Conflict Avoidance, Authority, and Rivalry.

 $\forall n \in T, x, y \ (ConflictAvoidance(n, T) \rightarrow (Authority(x, y, n))) \leftrightarrow Rival(y))) \ (Axiom \ 12).$

• Explanation:

According to Axiom 12, for a norm n in ethical theory T that seeks to avoid conflicts, one has that x has authority over y via n if and only if y is rival. That is, the condition for normative authority-and hence for exclusive property-is that the good behaves as a rival (i.e., does not allow simultaneous uses by different subjects).

• Deduction of the Equivalence between Normative Authority and Rivalry **2.4.

Applying modus ponens to the statement of 2.2 and 2.3, we deduce:

 $:: \forall n \in T, x, y \ (Authority(x, y, n))) \leftrightarrow Rival(y)).$

• Rule of Inference:.

Here we use **biconditionality** and its application via modus ponens on the hypothesis that in any ethical theory one seeks to avoid conflict, so that authority is precisely linked to rivalry. (It should be clarified that the precise use of modus ponens in a biconditional requires, first, proving "if A then B" and then "if B then A"; the way the axiom is presented already suggests an equivalence, hence the conclusion is drawn).

• 2.5. Application of the Principle of Non-Contradiction to Simultaneous Use in Goods.

 $\forall n \in T, x \neq z, y \ Good(y) \land (Use(x, y, E1) \land Use(z, y, E2)) \rightarrow \neg \Diamond (\neg \Diamond (Use(x, y, E) \land Use(z, y, E))).$

• Explanation:

This step is based on the **principle of non-contradiction**: if a good is used by two agents (which would classify it as abundant), then it is not possible for that good to also be rivalrous, since rivalry requires that there cannot be simultaneous use that allows exclusivity. A conditional inference is employed: since simultaneous use contradicts exclusivity of use (and, by extension, exclusive control), the modal possibility of such exclusive use is denied.

• 2.6. Conclusion on the Impossibility of Rivalry:

From the application of the definition of Rivalry (Definition 8) and the consequence of step 2.5, it follows:

 $\therefore \neg \Diamond (Rival(y)).$

• Rule of Inference:.

We use **modus ponens**: since simultaneous use (presence of abundance) precludes rivalry (by the definition of Rival: $\forall x \neq z, y, E1, E2 \ Rival(y) \equiv Good(y) \land (\neg \Diamond (Use(x, y, E) \land Use(z, y, E))))$), we conclude that it is impossible for y to satisfy the condition of being rival in the sense required for normative authority.

• 2.7.Deduction of the Impossibility of Exercising Normative Authority**.

From the equivalence established in 2.4 (that Authority(x,y,n) is equivalent to Rival(y)) and the result of 2.6, we conclude:

 $\therefore \neg \Diamond (Authority(x,y,n)).$

• Rule of Inference:

Again **modus ponens** on equivalence is applied: if, in order to exercise authority, it is indispensable that \mathbf{y} be rival, and it has been shown that it is impossible for \mathbf{y} to be rival (in modal terms) in the presence of simultaneous uses, it follows that it is also impossible for normative authority over \mathbf{y} to exist.

• 2.8. Impossibility of Exclusive Ownership

Finally, using the Definition of Property,

 $Ownership(x,y) \equiv ExclusiveControl(x,y).$

and recalling that exclusive control requires both rivalry and normative authority (see Definition of Exclusive Control in Definition 6), it follows:

 $\therefore \neg \Diamond$ (*Property*(*x*,*y*).

• Rule of Inference:

The conclusion is obtained by **modus ponens** applied to the relation between authority, rivalry and property. Since the modal impossibility of having authority (and, consequently, of achieving exclusive control) has already been demonstrated, it is concluded that it is impossible for any subject \mathbf{x} to have ownership over \mathbf{y} when \mathbf{y} is abundant.

0.1. 3.2 Conclusion by Reduction to the Absurd (Step 3)

Final Statement:

The initial hypothesis of the statist assumption is:

 $\exists y \exists x (Abundant(y) \land Ownership(x,y)).$

But, from the development (Step 2), it is shown that for all x and y it holds:

Abundant(y) $\rightarrow \neg \Diamond$ (Property(x,y)).

The combination of both statements yields the contradiction:

Property(x,y) $\land \neg \Diamond$ (*Property*(x,y)).

Explanation:

The contradiction is achieved by **reduction to the absurd**: one assumes the existence of an abundant good with exclusive ownership and, from the chain of inferences (linking the definition of simultaneous use, the impossibility of rivalry and, hence, of normative authority and exclusive control), one deduces that it is impossible (modally) for exclusive ownership to exist. Therefore, the initial hypothesis is rejected.

Rule of Inference

The reduction to the absurd (reductio ad absurdum)** is applied when noticing that the assumption of the existence of exclusive ownership in an abundant good leads to a logical contradiction, so it is concluded:

 $\neg \Diamond (Property(x,y))$

This is the final conclusion of the argument, which rejects the formal justification of intellectual property in the presence of abundant goods.

0.1. Conclusion of the Analysis

To summarize rigorously:

1. Introduction and Objective: 2.

The argument seeks to show that in a normative system in which "good," "use," "authority," "exclusive control," and "ownership" are defined, the allocation of exclusive ownership is incompatible with the abundance of a good (i.e., the possibility of two or more agents making use of it).

2. Definitions and Axioms:.

Each of the axioms and definitions is used to construct the theoretical framework linking the possibility of use with the exclusivity necessary to have ownership. In particular, ownership is equated with exclusive control, which requires that the good be rivalrous (preventing simultaneous uses) and that normative authority be exercised.

- 3. Development of the Argument:** **.
 - It is based on the statist assumption that there is an abundant good over which some subject is the owner.
 - It is assumed that there is at least one simultaneous use by two agents (which defines abundance).
 - By means of the relation established in ethical theory (especially through the equivalence between normative authority and rivalry), it follows that if a good is used simultaneously by different agents, it cannot satisfy the condition of rivalry necessary for authority to be conferred on it and, therefore, for exclusive ownership to be possible.
 - The modal impossibility of ownership (¬◊(Property(x,y))) is obtained, which contrasts with the initial hypothesis and, by reductio ad absurdum, the statist assumption is rejected.

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- The modal impossibility of ownership (¬◊(Property(x,y))) is obtained, which contrasts with the initial hypothesis and, by reductio ad absurdum, the statist assumption is rejected.
- 4. Rules of Inference Clarified:** **.
 - The existential and conjunction introduction is used to formulate the hypotheses of use.
 - Modus ponens is employed in several steps to apply implications derived from the axioms (e.g., equivalence between normative authority and rivalry).
 - Finally, reductio ad absurdum is used to conclude that the assumption leads to a contradiction.

The final conclusion is that, within this formal framework, it is not possible to justify exclusive ownership over a good that is inherently abundant, which calls into question the formal justification of intellectual property when applied to goods that can be used by multiple agents.