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The principle of explosion in the stoic logic. (English. English summary)

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The Stoic philosophers developed a formal propositional language during the Hellenistic period, which included propositional variables and propositional connectives. In this language, ordinal numerals serve as propositional variables: the first (sentence), the second (sentence), etc. Compound sentences are constructed from simple ones and connectives according to the following patterns:

- (1) Negation: not the first;
- (2) Conjunction: both the first and the second;
- (3) Disjunction: either the first or the second;
- (4) Implication: if the first then the second,

where the first and the second can be any sentences, whether simple or compound. Therefore, the propositional syntax of the Stoics can be reliably and directly transposed into contemporary logic.

Following Jan Łukasiewicz's seminal lecture *On the Stoics' logic* (delivered in 1923), and for most of the 20th century, it was widely believed that Stoic propositional logic was simply an early or premature version of classical propositional calculus. However, at the turn of the 20th and 21st centuries, several works were published arguing that Stoic logic was either relevantistic or paraconsistent. This view became widely accepted in the 21st century.

Breaking with the trend that has prevailed over the last three decades, the author of the present paper aims to justify a weakened version of Łukasiewicz's thesis. Without determining whether the Stoic logic is equivalent to classical propositional calculus, the author seeks to demonstrate that it is at least explosive. Recall that a logical system is called *explosive* if and only if it permits deriving every sentence from an inconsistent set of sentences. Theorems that establish explosiveness are called principles of explosion. Logics that are not explosive are called *nonexplosive*.

The author notes that the principle of explosion has a surprisingly high number of simple, yet difficult-to-challenge proofs. Explosion appears to be a borderline case of consequence, similar to zero in the collection of numbers and a point in topology. However, typical proofs of the principle of explosion often involve borderline cases of basic principles. Since the existing sources on the ancient history of logic are fragmentary, mostly secondary, of low quality, and often authored by nonlogicians, they frequently contain careless statements that seem to contradict borderline case laws of logic. Consequently, *prima facie* proofs of the principles of explosion are often easy targets for challenges.

Therefore, it is of utmost interest to determine whether there is a proof of a principle of explosion based solely on bedrock principles—namely, those that are firmly attested and never denied in the extant source material. It turns out that such an unequivocal formulation of explosiveness does exist.

The main lines of reasoning used by the author in this article are as follows:

While it remains uncertain whether the Stoics' accounts of disjunction and implication connectives are to be understood as truth-functional or modal, it is quite clear and universally accepted in the scholarship that the connectives of negation and conjunction were considered truth-functional (Boolean). Furthermore, although ancient thinkers generally spoke of truth-values as relative to time, it is a well-established fact that the Stoics, like their predecessors the Dialecticians, were strong defenders of the principle of bivalence. Given the principle of bivalence and the truth-functional account of the connectives of negation and conjunction, it is justified to claim that, with regard to the

truth-values and consequently the tautologicity of single formulas constructed using only the connectives of negation and conjunction, Stoic logic aligns perfectly with classical propositional calculus.

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