

## Eliminating Undecidability and Incompleteness in Formal Systems

To eliminate incompleteness, undecidability and inconsistency from formal systems we only need to convert the formal proofs to theorem consequences of symbolic logic to conform to the sound deductive inference model.

Within the sound deductive inference model a conclusion is only true when it is provable (**a connected sequence of valid deductions from premises to conclusion**) on the basis of true premises.

### **Axiom(0) Stipulates this definition of Axiom:**

An expression of language defined to have the semantic value of Boolean True.

### **Stipulating this specification of True and False:**

Axiom(1)  $\forall F \in \text{Formal\_System} \forall x \in \text{Closed\_WFF}(F) (\text{True}(F, x) \leftrightarrow (F \vdash x))$

Axiom(2)  $\forall F \in \text{Formal\_System} \forall x \in \text{Closed\_WFF}(F) (\text{False}(F, x) \leftrightarrow (F \vdash \neg x))$

### **Stipulating that formal systems are Boolean:**

Axiom(3)  $\forall F \in \text{Formal\_System} \forall x \in \text{Closed\_WFF}(F) (\text{True}(F, x) \vee \text{False}(F, x))$

Axiom(0) provides the symbolic logic equivalent of true premises. Axiom(1) and Axiom(2) stipulates that consequences are provable from axioms. Axiom(3) screens out semantically malformed sentences as not belonging to the formal system.

### **The third step of the Tarski Undefinability Theorem proof:**

(3)  $x \notin \text{Pr}$  if and only if  $x \in \text{Tr}$

Refuted on the basis of contradicting simplified Axiom(1):  $x \in \text{Tr} \leftrightarrow x \in \text{Pr}$

### **The following logic sentence is refuted on the basis of Axiom(3)**

$\exists F \in \text{Formal\_System} \exists x \in \text{Closed\_WFF}(F) (G \leftrightarrow ((F \not\vdash G) \wedge (F \not\vdash \neg G)))$

There is no sentence G of Formal System F that is neither True or False.

### **Making the following paragraph false:**

The first incompleteness theorem states that in any consistent formal system F within which a certain amount of arithmetic can be carried out, there are statements of the language of F which can neither be proved nor disproved in F. (Raatikainen 2018)

Raatikainen, Panu, "Gödel's Incompleteness Theorems", The Stanford Encyclopedia of Philosophy (Fall 2018 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/fall2018/entries/goedel-incompleteness/>.

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