An operation $F: V \to V$ (resp. $HF \to HF$) is called *positively inductive definable* (resp. *PTIME-computable*) if for some LY-formula (resp. LY-formula with nonlogical symbol $<$ for linear order) $\mathscr{R}_F(R, \alpha, \bar{x}, \bar{y})$ the equality

$$F(C(R,\alpha)) = C(\{\langle \bar{x}, \bar{y} \rangle \mid \mathscr{R}_F(R, \alpha, \bar{x}, \bar{y})\}, \langle \alpha, \dots, \alpha \rangle)$$

holds for each graph $G = \langle |G|, R^G, \alpha^G \rangle$ in V (resp. for each finite linear ordered graph $G = \langle |G|, <^G, R^G, \alpha^G \rangle$ in HF).

Moreover, let V be any model of theory: pure *Kripke-Platek set theory* with foundation axiom *only* for bounded set-theoretic formulas and with *additional axioms* on collapse and transitive closure operations and on the bounded analog of Y-construct, positive inductive Δ-separation, $\nu p.\{x \in a \mid \varphi(p,x)\}$, which denotes the least $p \subseteq a \in V$, $p = \{x \in a \mid \varphi(p,x)\}$, with φ a bounded set-theoretic formula.

THEOREM. *Provably recursive (i.e. provably total Σ-definable) operations $F: V \to V$ of this theory = inductively definable ones and = PTIME-computable ones if V is HF and also = definable by operators of pairing $\{t,s\}$, Δ-union $\bigcup\{t(x) \mid x \in s \;\&\; \varphi(x)\}$, φ being a bounded formula, collapsing, transitive closure and inductive Δ-separation.*

PETER SCHROEDER-HEISTER, *Uniform proof-theoretic semantics for logical constants.*
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By *proof-theoretic semantics* I mean the approach according to which the semantics of logical constants is given in terms of proofs. This approach goes back to Gentzen's and Prawitz's analysis of first-order proofs in terms of natural deduction, and has gained particular attention in so-called "anti-realistic" conceptions within the philosophy of language. Its basic principles are the following:

(A) Closed proofs are primary as compared to open ones.

(B) Introduction rules are central for the meaning of logical constants.

(C) The notion of reduction plays a fundamental role in defining the validity of proofs.

I claim that, whereas (C) is basic for the idea of a proof-theoretic semantics, both (A) and (B) can be challenged. If one bases the notion of validity of proofs on proofs from atomic assumptions rather than closed proofs (as in (A)), then one obtains a proof-theoretic semantics for various logics, which, although intuitionistically biased, differ from intuitionistic logic in the structural rules they presuppose (such as contraction-free, relevant or linear logics). This can be carried out in a uniform way for all of these logics. Philosophically, this means that hypothetical reasoning (reasoning from assumptions) is more fundamental than categorical reasoning (reasoning without assumptions).

Furthermore, an approach to proof-theoretic semantics can be developed which unlike (B) is based on elimination rules rather than introduction rules, thus leading to logics which are anti-intuitionistic in spirit and dual to those considered before. Its philosophical motivation relies on the idea that falsification is conceptually prior to verification (or at least equally fundamental).

The framework of this investigation is sequent-style rather than Gentzen-Prawitz-style natural deduction. In not making structural presuppositions explicit, the latter is conceptually too much tied to intuitionistic logic.

LERE SHAKUNLE, *Identity and complementarity.*
Matran Computers, W-7900 Ulm, Germany.

Identity and complementarity are two concepts on which logic and mathematics meet to agree. But this agreement is based on the condition that neither of them asks to know what happens—to logic and mathematics, mathematical logic implicit—if one tries to prove itself in the other. The logico-philosophical implications of a project that sets out to prove identity in complementarity and vice versa are the following: (i) The law of excluded middle disappears entirely from the firmament of logic and mathematics, thus fulfilling, at last, the hopes of intuitionistic logic. (ii) Quantum uncertainty, the prop of probability, is replaced by the truth potential. (iii) Contradiction is flushed out. (iv) Paradoxes are no more. (v) Being, hitherto split by dichotomy, is recaptured in unity. Identity and complementarity, the classical complementary logic notwithstanding, are objects of definition rather than entities which confer meaning on objects. In classical logics, identity and complementarity are not isomorphic. This paper sets out to defend a thesis that says (I) identity and complementarity are other-inclusive, (II) the law of