

# Partiality and Tichý's Transparent Intensional Logic: Solutions to Selected Issues

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To work with *partial functions* (having no value but a gap for some of their arguments) is frustrating: classical logical laws (e.g., De Morgan law for exchange of quantifiers) designed for total functions usually (if not ever) collapse. To incorporate partial functions, Tichý suggested the modification of (the natural deduction for) the logic of simple theory of types mainly by the correction of the rule of  $\beta$ -reduction (because of partiality,  $\beta$ -reduction is not a rule equivalent to  $\beta$ -expansion). As it is apparent from Tichý's collected papers and his monograph, Tichý's transparent intensional logic, treating both modal and temporal variability, is a powerful logical system for logical analysis (explication) of natural language meaning.<sup>1</sup> The present author shows how to define within Tichý's system "3-valued connectives" which get a value even when an "input proposition" is gappy (e.g., "exclusion negation" or "totalizing true-predicate"). Another contribution is made by the correct formulation of the extensionality principle for partial functions. Another contribution is made by correct formulation of the notion "complementary function", i.e. a function non- $F$  having extensions which are "complementary" to extensions of the function  $F$  (not only two intuitively plausible explications, but rather partial classes complicate the matter).

## References

- (1) Tichý, P., *The Foundations of Partial Type Theory*. Reports on Mathematical Logic, 14 (1982)
- (2) Tichý, P., *The Foundations of Frege's Logic*, Walter de Gruyter, 1998
- (3) Tichý, P., *Pavel Tichý's Collected Papers in Logic and Philosophy*. V. Svoboda, B. Jespersen, C. Cheyne (eds.), Dunedin: University of Otago Press, 2004
- (4) Raclavský, J., *Defining Basic Kinds of Properties*, in: T. Marvan, M. Zouhar (eds.), *The World of Language and the World beyond Language*, Filozofický ústav SAV, 2007. [The text includes a rigorous classification of

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<sup>1</sup>The adoption of partial functions for logical analysis of natural language was stressed also by Imre Ruzsa (e.g., *An Approach to Intensional Logic*, *Studia Logica* 40 (1981)).

properties (as functions from possible worlds to classes of individuals) such as “being a non- $F$ ” within Tichý’s system; it can be easily generalized to classification of all intensions or rather all functions.]

- (5) Raclavský, J., *Explications of Being Truth* [in Czech, expanded English version is in preparation], SPFFBU B 53 (2008) [Three kinds of truth predicate are explicated by means of Pavel Tichý’s transparent intensional logic. The first predicate applies to propositions; the second applies to so-called constructions (some of them construct propositions); the third applies to expressions (usually expressing constructions). Since mappings may be partial and constructions may be abortive, a partial and a total variant correspond to each kind. To the second and the third kind it corresponds also a partial-total variant (which is the most natural one), and a partial-partial variant too (for the last kind they exist two combinations of the two preceding versions). The truth of expressions is language-relative.]
- (6) Raclavský, J., *Semantic Concept of Existential Presupposition*. [Just before submission. The explication of the semantic concept of existential presupposition in the connection with deriving of existential statements, distinguishing their *de dicto* / *de re* (in a rather generalized, Tichý’s, sense) variants.]