HEYTING-OCKHAM LOGIC AND HYPERINTENTIONALITY

S. P. ODINTSOV

The logic HYPE was recently [3] suggested by H. Leitgeb with the aim to give a basic propositional logic allowing to deal with hyperintensional contexts. The approach to negation in HYPE is a combination of 'Star' and 'Perp' from [2], where J.M. Dunn denoted in this way two basic approaches for treatment of the negation operation, via *-star operator and via the incompatibility relation:

$$(\neg^*) \quad w \models \neg\varphi \quad \text{iff} \quad w^* \not\models \varphi$$
$$(\neg^\perp) \quad w \models \neg\varphi \quad \text{iff} \quad \forall u(u \models \varphi \text{ implies } u \perp w)$$

Moreover, the negation of HYPE has also features of strong negation [4]. A complex combination of conditions involved in the definition of HYPE semantics implies however that the resulting negation operator loses the features of strong negation, moreover, 'Perp' turns to 'Star'.

It turns out that logic HYPE is closely related to Heyting-Ockham logic N^* introduced in [1] as a framework for studying logical foundations of WFS [6] (well founded semantics of logic programs with negation). Algebraic semantics for N^* and the term 'Heyting-Ockham logic' were suggested in [5].

In this talk we track the history of 'Star' approach to negation, demonstrate that in Vakarelov's theory [7] of negation N^* can be characterized as the least normal and co-normal logic with intuitionistic impication, and show that proof theoretically hyperintentional HYPE turns out to be equivalent to intensional $N^* + \{\varphi \leftrightarrow \neg\neg\varphi\}$.

REFERENCES

[1] P. Cabalar, S.P. Odintsov, D. Pearce, Logical Foundations of Well-Founded Semantics, in: P. Doherty et al. (Eds.) *Principles of Knowledge Representation and Reasoning: Proceedings of the 10-th International Conference (KR2006)*, AAAI Press, Menlo Park, California, 25–36, 2006.

[2] J.M. Dunn, Star and Perp: Two Treatments of Negation, *Philosophical Perspectives* 7:331–357, 1993.

[3] H. Leitgeb, HYPE: A System of Hyperintensional Logic (with an Application to Semantic Paradoxes) *Journal of Philosophical Logic* First online, 2018.

[4] D. Nelson, Constructible falsity, *Journal of Symbolic Logic*, 14:16–26, 1949.

[5] S.P. Odintsov, Combining intuitionistic connectives and Routley negation, *Siberian Electronic Mathematical Reports*, 7:21–41, 2010.

[6] A. Van Gelder, K.A. Ross, and J.S. Schliphf, The well founded semantics for general logic programs, *Journal of the Association for Computing Machinery*, 38:620–650, 1991.

[7] D. Vakarelov, Consistency, Completeness and Negation, In: Paraconsistent Logic. Essays on the Inconsistent, Phylosophia Verlag, Münich, 1989.

SOBOLEV INSTITUTE OF MATHEMATICS, NOVOSIBIRSK (RUSSIA)
E-mail address: odintsov@math.nsc.ru