JOUKO VÄÄNÄNEN, *Definability by n-ary generalized quantifiers.*

It is shown that for any natural number n there is an $(n + 1)$-ary generalized quantifier which is not definable in terms of n-ary generalized quantifiers.

Examples of unary (i.e. 1-ary) generalized quantifiers are the well-known quantifiers $Q_\alpha x\phi(x)$, "there exists at least ω_α x such that $\phi(x)$". Examples of n-ary generalized quantifiers are the Magidor-Malitz quantifiers $Q^n_{\mathrm{MM}}x_1 \cdots x_n\phi(x_1,\ldots,x_n)$, "there exists an uncountable set X such that for any distinct $x_1 \cdots x_n$ in X, $\phi(x_1,\ldots,x_n)$ holds". The general form of an n-ary generalized quantifier in the sense of Lindström [1] is

$$(*)\qquad Qx^1_1\cdots x^1_{n_1}\cdots x^m_1\cdots x^m_{n_m}\phi_1(x^1_1,\ldots,x^1_{n_1})\cdots\phi_m(x^m_1,\ldots,x^m_{n_m}),$$

where $n_i \leq n$ for all $i \leq m$.

The generalized quantifier Q as above is definable in terms of generalized quantifiers $Q^1,\ldots,Q^k$ if there is a formula in the extension of first order logic $L_{\omega\omega}$ by the new quantifiers $Q^1,\ldots,Q^k$ which is semantically equivalent to $(*)$.

THEOREM. *There is an $(n + 1)$-ary generalized quantifier which is not definable by n-ary generalized quantifiers.*

The motivation for studying this kind of undefinability results is the following: Let L be an abstract logic in which the quantifiers given by the theorem for various n are all definable. Then L cannot be a so-called finitely generated logic; that is, a logic obtained from first order logic by adding a finite number of new generalized quantifiers. In this way we can conclude that weak (or strong) second order logic is not finitely generated.

REFERENCE

[1] PER LINDSTRÖM, *First order predicate logic with generalized quantifiers*, **Theoria**, vol. 32 (1966), pp. 186–195.

EDUARD W. WETTE, *1977 Wroclaw abstract renewed: Computation of the anisotropic proportions in an anti-Einsteinian representation of all motions. I.*

For the complete title cf. XLIV, p. 476, [12]; Firenze 1982, Aachen 1983 conserved §2$^>$ (Part II) and §1 (inconsistency $\ll 2^{69}$). The renovation of §2 can now refer to my 1983 Islamabad contribution (ICSIP, Group I; Interaction of Islamic Thought at the Frontiers of Knowledge), entitled *Theometric Consequences of 'Soul'-Computation: Solution to the Universal Problem of 'Motion', and Religion* (l.c., Papers Presented, Vol. 2, pp. 123–152; Abstracts, pp. 81–82, Past).

§2. Formal end of physics, astronomy: definitive representation versus models.

Primary 'motion' is determined by the immutable web with elastico-definite metrics on a *max*imal surface (e.g., "directional" propagation of pouch-waves) under constraint to its own flattening & equalizing average. Variation methods, uniform in "real" numbers, fail; no information on substantial curvature from tensor-contraction. Intrafinite recursion computes the optimal distribution of angles & distances between net-points or shearing & normal strain along threads.

Predictions on 'measurement', i.e. projection 'diagram-net $\dashv$ average-net': (i) $\hbar(\nu) = \hbar/(1 + (2\pi\nu/\nu_0)^2)^{1/2}$, $\nu_0 = 2 = 0.2$ TTHz; (ii) §1 $\rightarrow$ total average $\mathfrak{T}$ finite $\wedge$ geodesics' azimuth $\neq$ const, $\mathfrak{T}$-net without singularities $\rightarrow \mathfrak{T} = (n + 1)$-torus, $c = (\text{shear}/\text{density})^{1/2} \rightarrow$ no space-expansion, isotropic $c(\beta_0,\ldots,\beta_{n-1}) = \mathrm{d}s_{n-1}/(r\mathrm{d}\beta_n) = \cot\alpha \rightarrow c(r) = ((r/C_1)^2 - 1)^{1/2} \wedge C_1 = (1 - \rho_{n-1})\sin\alpha_{\max}$, $((\mathrm{v}\vdash)n = 3 \wedge \omega_1 P_3 =$ second-arc $\rightarrow$ Hubble's redshift is a carrousel-effect $\wedge$ Milky Way has the central position $(0,0,\pi) \wedge c_{\min} = \cot\alpha_{\max} = 0.2997925$ Gm/sec; (iii) $n + 1$, $\binom{n+1}{2}$, $\binom{n+1}{2}$, $\frac{1}{3}n(n+\frac{1}{2})(n+1)$, $(n+1)\binom{n}{2}$ $\mathfrak{T}$-components under $\dagger \times 1, 3, 4, 4, 16$ nonvanishing g_{jk}, $\Gamma_{j.kl}$, R_{jklm}, $R_{jklm;p}$, $R_{jklm;pq}$ are linearly independent $\{\dagger = 4, 6, 6, 14, 12 \leftarrow n = 3\}$; (iv) sun forms a cone-apex $\rightarrow$ sun outside planes of planetary orbits, stars' number $\rightarrow$ 3-cone of star with environment has cymbal-profile $\wedge$ *negative mass* in the anti-curved kernel of a star; (v) §1 $\rightarrow$ *closed* $\mathfrak{T}$-geodesics (c.g.), $T_1\colon \sec \sim (1 - \rho_{n-1})\colon(1/\cot\alpha_{\max}) = \mathrm{Max} \rightarrow \mathfrak{T}$-proportion (!) $r_n{:}r_{n-1}{:}r_{n-2}{:}r_{n-3} = 1{:}0.3669{:}0.1136{:}0.0992$ (for $m^*_1 = 1 \wedge m^*_0 = 3, 5, 8) \wedge \alpha_{\max}$ 39°31′46″ {II(vi), Legendre 1825–1828, TI-30} $r_{n-2} - r_{n-3} \ll r_{n-3} \rightarrow n - 3 = 0$, $r_3 = \mathbf{1} \approx 10^{41}$ (i) ≈ 0.28TTKm $\rightarrow 1/T_1 = \omega_1/(2\pi)$ $= 0.3325$ aHz; (vi) topometric c. g.-"quantization" Q on $\mathrm{d}\beta_2{:}\mathrm{d}\beta_1{:}\mathrm{d}\beta_0 \rightarrow$ locating $(\beta_0,\beta_1,\beta_2)$ of galaxies without observation; (vii) $c(r)$-focussing $\rightarrow$ caustic $(\beta_0,\beta_1,\beta_2)$-spectrum of QSS/QSG; (viii) time-expansion $r/0.4203 \approx \nu_{\text{emit}}/\nu_{\text{obs}} \rightarrow$ Earth maximizes the hierarchy of bio- & psycho-tunnels (with singular cross-points of *small* multiplicity in 'time' and *one* 'spatial' dimension); (ix) no competitive exobiology & exopsychology; (x) the earth moves with a scaffolding of monadic threads which meet in immovable cross-points.

Addenda. Optimal polygon $\tilde{z}_j = d\exp(i\tilde{\gamma}_j)$ to N points $z_j = d_j\exp(i\gamma_j)$ with centre $\sum z_j/N = 0$; $\tilde{\gamma}_j - \tilde{\gamma}_0 = 2\pi j/N = o_j$. Then

$$\tan\tilde{\gamma}_0 = \sum d_j \sin(\gamma_j - o_j)\Big/\sum d_j\cos(\gamma_j - o_j), \qquad \tilde{d} = \sum d_j\cos(\gamma_j - \tilde{\gamma}_j)$$

solve $\sum|z_j - \tilde{z}_j|^2 = \mathrm{Min}(= \sum d_j^2 - N\tilde{d}^2)$; $\tilde{d} > 0$ determines $\tilde{\gamma}_0 \bmod 2\pi$.

Cymbal: $\quad d\langle\geq,\leq\rangle d_* = \xi p/2 \rightarrow \langle(y - p\sqrt{\xi}(1 + \xi/2))^2 = 2pd, y^2 + d^2 = d_*^2(1 + \xi)\rangle$;

geodesics: $C = 0 \rightarrow \Lambda = \Lambda_0$,

$$C\langle\geq,\leq\rangle p/2 \wedge d \geq C \geq d_* > 0 \wedge k^2 = \tfrac{1}{2} + C/p \wedge C/d = 1 - 2\cdot\langle 1, k^2\rangle\sin^2\varphi \rightarrow \Lambda - \Lambda_0$$
$$= \pm 2\sqrt{p/C}\cdot\langle kE(1/k,\varphi), E(k,\varphi) - (1 - k^2)F(k,\varphi)\rangle.$$

II(vi) restricted:

$$b = a + 1 = j_1 + \lambda \ \ (l > \lambda > 0) \vdash r^*_{(a)0} = P_{j_1} + \cdots + r_a = (P_a)_{\max} \wedge r^*_{(a)1} = r_b.$$

H. W. ZEEVAT, *Discourse representation structures as logical formulae.*

Kamp's approach to natural language semantics, presented in [1], seems a clean break with the more traditional attempts: the use of a formal language is abandoned in favour of a notion of tree-like structures with a non-Tarskian concept of satisfaction defined on it. I will present a version of predicate logic that conforms with Kamp's ideas, and that can be interpreted in an almost normal way.

REFERENCE

[1] HANS KAMP, *A theory of truth and semantic representation*, ***Formal methods in the study of language. Part 1 (proceedings of the third Amsterdam colloquium, 1980)***, Mathematical Centre Tracts, no. 135, Mathematisch Centrum, Amsterdam, 1981, pp. 277–322.

WILLIAM ZWICKER, *Structural properties of ideals on $P_\kappa\lambda$.*

In their paper [1], Baumgartner, Taylor and Wagon generalized some important properties of ultrafilters on an uncountable cardinal κ so as to imply κ-complete ideals, incidentally providing much grist for the set-theoretic topologists' mill. The recent notion of a stationary coding set appears to provide an avenue by which their program can be carried out, at least in part, in the context of $P_\kappa\lambda$.

REFERENCE

[1] J. E. BAUMGARTNER, A. D. TAYLOR and S. WAGON, *Structural properties of ideals*, ***Dissertationes Mathematicae. Rozprawy Matematiczne***, vol. 197 (1982).

M. KUTYŁOWSKI, *Some results on initial Grzegorczyk's classes.*

We prove some theorems which are closely related to unsolved problems concerning initial classes of the Grzegorczyk's hierarchy, i.e. the problem whether "$E^0_* = E^1_*$" and "$E^1_* = E^2_*$".

We define classes I^0, I^1, I^2 which are defined similarly as E^0, E^1, E^2: I^i is the smallest class containing initial functions: projections, subtraction and the ith Ackermann function, closed under the operation of composition and bounded iteration scheme. It is easy to see that $I^i \subseteq E^i$ and $I^2 = E^2$. We prove that $I^0 = E^0$ implies that $E^0_* = E^1_*$. On the other hand we prove some theorems which suggest that $E^0 = I^0$.

We prove that $I^0_* = I^1_*$.

We introduce classes $E^{0+(n)}$ which are defined from initial functions of E^0 by operations of composition and bounded recursion scheme defining simultaneously at most n functions. We easily see that $E^0 = E^{0+(1)} \subseteq E^{0+(2)} \subseteq E^{0+(3)} \subseteq \cdots$.

It is known that $E^2_* = \bigcup_{n\in N} E^{0+(n)}$.

We prove that if, for some n, $E^{0+(n)}_* = E^{0+(n+1)}_*$, then $E^0_* = E^2_*$.

In particular we obtain the following equivalence:

$$E^0_* = E^2_* \quad \text{iff} \quad E^0_* = E^{0+(2)}_* \quad \text{iff} \quad E^0 = E^{0+(2)}.$$