Paul Weingartner, *A note on Aristotle's theory of definition and scientific explanation.*

The purpose of the paper is to show that Aristotle had a kind of criterion of noncreativity in his theory of definition and a requirement for scientific explanations which amounts to finding an interpolation-sentence. The relevant passages are in Aristotle (Anal. Post. II, Chapters 2, 7).

More accurately Aristotle's criterion of noncreativity which is weaker than the one used in modern logic is this: A definition D introducing a new symbol of a theory satisfies the Aristototelean criterion of (existential) noncreativity iff there is no formula T which affirms the existence of the definiens or of any part of it and in which the new symbol does not occur such that $D \to T$ is derivable from the axioms and preceding definitions of the theory but T is not so derivable. Or in simpler words: a definition does not permit the proof of existence theorems about the definiens (or parts of it) which were previously unprovable.

One of Aristotle's requirements concerning a scientific explanation is that the definiens of a definition (about the essence of something) occurs as the middle term in the proof (syllogism). The search for the definiens is the search for the middle term in an explanation ("why-proof"). Now it can be shown that the requirement to find the middle term in a syllogism which is a scientific explanation (a why-proof) is nothing else than the requirement to find an interpolation-sentence. This is substantiated by the fact that a syllogism which serves as a scientific explanation must be affirmative, universal and of the first figure such that the modus BARBARA is the only one left.

Volker Weispfenning, *On the model theory of valued regular rings.*

Let R be a commutative regular ring with 1 in the sense of von Neumann. We define the notion of a valuation w on R in a way that (R, w) has a representation as a sheaf of valued fields over a Boolean space. Then the model theoretic transfer principles of the author's paper in the ***Journal of Algebra***, vol. 36 (1975) can be applied to the Ax-Kochen theory of valued fields. This yields results on valued regular rings concerning model-completions, elimination of quantifiers, decidability, and prime model extensions.

Eduard Wette, *A refutation of primitive recursive* (*and of elementary*) *computability.*

§1. The exhibition of a 'consistency'-inconsistency-deduction $D_\wedge$ within intuitionistic arithmetic [1] [2] has led to an examination of its number a_0, especially of the peculiar 'consistency'-"theorem" for a_0, and, moreover, to an intrafinite restriction $\leq b_0$ of numerals which can be substituted for a variable. Therefore the propositional calculus derives a formula F which ought to be underivable, since F is not identically true [4]. The variation of F into a propositional schema transforms the derivation D_* of F into a derivation D_+ of a contradiction $P \wedge \neg P$. F depends on a few computations ν with proposition letter indices, like $j(k) = k$, $\ulcorner\langle kl\rangle\urcorner = \binom{k+l+1}{2} + l$, $\ulcorner\langle kk\rangle\urcorner = 2 \cdot k \cdot (k+1)$; F can be expressed in terms of ($\pi_0, \pi_1, \cdots, \wedge, \neg$, and) $\bigvee_{m,\nu(m)\leq m_0} \pi_{\nu(m)} \leftrightarrows \pi_{\nu(0)} \vee \cdots$, $\bigwedge_{m;\nu(m)\leq m_0} \pi_{\nu(m)} \leftrightarrows \pi_{\nu(0)} \wedge \cdots$, where m_0 $(\geq \nu(b_0))$ is a joint limit for the occurrences of *long* $\vee$-/$\wedge$-series.

§2. An *economical* $\mathfrak{K}_0$-numbering within a "vicesimal" system, which uses $0\,..\,9\;\bar{0}\,..\,\bar{9}$ as digits, yields $10^{10^{3}N}$ as an (explicit, but abbreviating) estimate for the inconsistent "natural" number b_0 $(< m_0)$, if $D_\wedge$ contains $N(\approx 10^6)$ single symbols [5]. *Hint.* $\ulcorner D_\wedge\urcorner = \ulcorner\vdash \cdots \to \vee \wedge\urcorner = \bar{9} \cdots \bar{0}45 < 20^N$; the total elimination φ [1] [4] in vicesimal terms is elementary (Kalmár, 1943), but its complete definition takes 16 pages. (Gauss' "measurable infinity" $9^{9^{9^9}} \approx 10^{10^{369693099.6}}$.)

§3. The arithmetized propositional logic entails 2-valued elementary 1-place functions $\chi_D(d)$, $\tau(c)$ (: d $\ulcorner$derivation$\urcorner$, $\ulcorner$formula$\urcorner$ c is identically true; value 1 'right', 0 'wrong'), and $\varepsilon(d)$ (: $\ulcorner$verification$\urcorner$ of $\chi_D(e) = \chi_D(e) \cdot \tau([e]_3)$ for $e \leq d$; $[d]_3$ computes the 3rd d-$\ulcorner$word$\urcorner$, i.e. the d-$\ulcorner$result$\urcorner$ [3, §1, [2]]), which produce $\vdash \varepsilon(d_0) = 1$ for each d_0.

Inconsistency computation: $d_* = \ulcorner D_*\urcorner$, $[d_*]_3 = \ulcorner F\urcorner$, $\varepsilon \in \mathfrak{E}^3$; $\vdash \varepsilon(d_*) = 1$, $\vdash \varepsilon(d_*) = 0$. *Instruction.* Use $d_0 = d_*$ and $\chi_D(d_*) = 1$, $\tau([d_*]_3) = 0$.

§4. The computation $\vdash \varepsilon(d_*) = 0$ is *shorter* (sic!) than the conceded computation $\vdash \varepsilon(d_*) = 1$, so that the uniqueness of values can be restored for practical applications. Contrary to "relativity &

uncertainty", I calculated a "definitive" (unchangeable, imaginative, finito-complete) substratum of 'motion' [5] [5, [1]] [5a].

§5. New $D_\wedge$-directions. [3, §§2, 4] included a uniform dissemination of parameter derivations [1, *2.3*, *3.2*]; [3, §5] formed a relative solution (: rs^ξ) "in" φ, ri^ξ for every ⌜$\mathfrak{Z}_0$-deduction⌝ by one collection of ⌜$\mathfrak{K}_0$-derivations⌝. $D_\wedge$ becomes more aesthetic, if (i) modus ponens [3, §4] gets $^{\Rightarrow}UV$ as the *left* supposition, and if (ii) grading levels [1, *3.1*] are determined by the levels of the *sub*formulas A, B, C, $\dot{C}$, $A(x)$, $\vee$, $\wedge$, $t_1 = t_2$, $+\,t_1t_2t_3$, $\times\, t_1t_2t_3$,, U, V, $U(x)$, $U_A(k_1..)$, $V_B(k_1..)$, $k_1 = k_2$, $+\,\dot{k}_1k_2k_3$, $\times\, k_1k_2k_3$ in inferences — even if $^{\rightarrow}$, $^{\wedge}x$, $^{\Rightarrow}$ occur twice outside those subformulas. My daughter, Elisabeth Wette, studied [2] for two days; she proposed to modify the 2nd premise of $\mathfrak{K}_0$-rule 13.8 (1975 IV 20): it is (iii) advantageous — not indispensable — to replace $^{\cup}\circ$ therein by $\circ^{\vee}$.

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EDWIN WIEDMER, *Exact computations on real numbers.*

From recursion theory we know that it is impossible to build a machine which, given any two decimal representations (DR) of reals r_1 and r_2, constructs a DR of $r_1 + r_2$. But if we consider *signed digit decimal representations* (SDDR) [1], it is very simple.

DEFINITION 1. $\langle k, s\rangle$ is an SDDR $\Leftrightarrow k \in Z$, s is a finite or an infinite sequence of integers between -9 and $+9$.

DEFINITION 2.

$$R(\langle k, s\rangle) := \begin{cases} \sum_{1 \le i \le \text{length}(s)} s_i \cdot 10^{k+1-i}, & \text{if } s \text{ finite,} \\[2ex] \sum_{1 \le i < \infty} s_i \cdot 10^{k+1-i}, & \text{if } s \text{ infinite.} \end{cases}$$

In fact we can interpret on a computer any flowdiagram built up from assignments $r_i := r_j + r_k$ (resp. $-, \cdot, /, \sqrt{\ }$) and (since deterministic alternatives are not constructive) nondeterministic alternatives $r_i \le 10^k$ or $r_i \ge -10^k$. Other representations, such as Cauchy-sequences of rationals or regular sequences used by E. Bishop, seemed to be less efficient. We study algorithmic properties of the above flowdiagrams in analogy to [2].