Логические исследования
2017. Т. 23. № 2. С. 96–97
УДК 510.644

Logical Investigations
2017, Vol. 23, No. 2, pp. 96–97
DOI: 10.21146/2074-1472-2017-23-2-96-97

V.I. Shalack

Some Remarks on A. Tamminga's Paper "Correspondence Analysis for Strong Three-valued Logic"

Shalack Vladimir Ivanovich
Department of Logic, Institute of Philosophy, Russian Academy of Sciences
12/1 Goncharnaya St., Moscow, 109240, Russian Federation.
E-mail: shalack@gmail.com

In this note we present two remarks to the A. Tamminga's paper. The first remark relates to incorrect Definition 1, and the second remark relates to the main theorem of the paper. We propose the necessary corrections.

Keywords: Tamminga, many-valued logic, correspondence analysis

A. Tamminga's paper [1] presents an interesting method that allows us to construct adequate systems of natural deduction for various extensions of Kleene's three-valued logic and can be extended to other finite-valued logics. Some definitions and theorems of the paper are incorrect, but they can be corrected. This must be done, as there are works in which the errors are reproduced.

1. In Definition 1 on page 257 the author introduces the concept of relation *"The truth-table entry E is characterized by an inference scheme* Π/ϕ*"* :

The truth-table entry E is characterized by an inference scheme Π/ϕ*, if E if and only if* $\Pi \models \phi$.

Obviously, in this form the definition is incorrect. One can fix it as follows:

The truth-table entry E is characterized by an inference scheme $\Pi/\phi \Leftrightarrow (E\ if\ and\ only\ if\ \Pi \models \phi)$.

2. On pages 257–259 the main theorem is formulated and proved. It's condition has the following form:

Theorem 1. *Let* $\phi, \psi, \chi \in \mathcal{L}(\sim)_m(\circ)_n$. *Then...*

Then there are 27 subcases of the theorem.

Let's look at the subcases for $f_\circ(1,1)$.

$$f_\circ(1,1) = \begin{cases} 0, \ iff \ \ \phi \wedge \psi \models \neg(\phi \circ \psi) \\ i, \ iff \ \ \phi \wedge \psi, (\phi \circ \psi) \vee \neg(\phi \circ \psi) \models \chi \\ 1, \ iff \ \ \phi \wedge \psi \models \phi \circ \psi \end{cases}$$

The proposed formulation of the theorem is simply not true. The relation $\Pi \models \phi$ *is valid if and only if for each valuation* v *it holds that if* $v(\phi) = 1$ *for all* ψ *in* Π, *then* $v(\phi) = 1$. Let us apply this definition to $f_\circ(1,1)$, where at least one of the formulas ϕ or ψ is contradictory, i.e. has the form $\varphi \wedge \neg\varphi$. In this case, all three subcases take place:

- $\phi \wedge (\varphi \wedge \neg\varphi) \models \neg(\phi \circ (\varphi \wedge \neg\varphi))$
- $\phi \wedge (\varphi \wedge \neg\varphi), (\phi \circ (\varphi \wedge \neg\varphi)) \vee \neg(\phi \circ (\varphi \wedge \neg\varphi)) \models \chi$
- $\phi \wedge (\varphi \wedge \neg\varphi) \models \phi \circ (\varphi \wedge \neg\varphi)$

But then the value $f_\circ(1,1)$ is not defined. The error can be corrected as follows:

$$f_\circ(1,1) = \begin{cases} 0, \ iff \ \ \dot\forall \phi, \psi[\phi \wedge \psi \models \neg(\phi \circ \psi)] \\ i, \ iff \ \ \dot\forall \phi, \psi, \chi[\phi \wedge \psi, (\phi \circ \psi) \vee \neg(\phi \circ \psi) \models \chi] \\ 1, \ iff \ \ \dot\forall \phi, \psi[\phi \wedge \psi \models \phi \circ \psi] \end{cases}$$

Similarly, for other subcases of the theorem.

References

[1] Tamminga, A. "Correspondence Analysis for Strong Three-valued Logic", *Logical investigations*, 2014, Vol. 20, pp. 255–268.