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PRACTICAL LOGIC FOR ECONOMISTS AND ALL USERS OF TABLES

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Abstract:
In this article I represent in the form of the formalized system that fragment of logic of a natural language which from an antiquity is intuitively used by economists at drawing up of tables which carry an imagery of relations of sets. For this representation I develop existential linearly-tabular diagrams. These diagrams are graphically reduced form of record of the logic information of statistical tables. The fragment of the diagrammatic dictionary of logic forms of attributive propositions is shown. (This full dictionary contains 148 diagrams). The algorithm of a diagrammatic method of drawing and checking of all possible conclusions from *n* any such propositions-premises with compound positive and negative terms is given. Free (consciously controllable) mastering of *all* logic natural language's means is necessary for optimal performance of economic thinking. Logical culture of natural language should be high enough for any scientist, economist, lawyer and simply a businessman.

Logical modes of thinking and inference ability are necessary conditions of rational use of resources, first of all, in the field of economics.

The economic scientific thinking, as well as scientific thinking in general, is impossible without practical logic of tables. The accounting tables were under construction on the papyrus in Ancient Egypt; the editor of tables is one of the most used programs in a computer. Nevertheless, people, acquiring this or that economic profession, don't study Logic as special discipline (as a majority of scientists, which work in other fields of science). What does logic ensuring of economic thinking and economic science represent itself? Without special study of Logic it can be only some realized intuitive logic. And, in this case, it's practical logic. For theory i.e. for accuracy of theoretical inferences, proofs and explanations, for logic systematization of theoretical concepts and propositions deductive logic is necessary. It is the most important section of Logic as a whole. As the result there is a question: what deductive practical logic of economic consciousness should be? If economic faculties included the standard courses of Logic in the curriculum, in these conditions the basic place in them would be occupied by traditional "philosophical" and classical mathematical logic (propositional logic and predicate logic). However, the classical propositional logic and predicate logic is unacceptable as real practical logic even in Mathematics, in view of paradoxes of material implication, i.e. such formulas as $A \rightarrow (B \rightarrow A)$, $A \,\&\, \neg A \rightarrow B$ and others [4]. According to these paradoxical formulas, the true proposition can be proved by any proposition, and the false proposition can be a sufficient reason for any proposition. To recognize these formulas as the laws of logic would mean firstly, a recognition of arguments of the any propositions as competent, irrespective of whether they're pertinent to and whether they're true, and secondly, acknowledgement of competence of any propositions as consequences from the obviously false propositions. If the first fact could bring to arbitrariness in argument, the second, on account of the responsibility for consequences, could bring to some arbitrariness in definition of consequences, which there comes the responsibility for.

Is intuitive, correct use of natural language's logic enough in expression of scientific economic thinking? In a principle it must be insufficient. The science proposes universal recognition of the truth and checkability of evidences. If the accuracy of logic proof didn't become clear for others, also thesis of the proof can't be considered proved, even if the proof is constructed correctly on intuition. Besides, the intuitive logic doesn't relieve of mistakes, which could be eliminated at the conscious control. Here of follows, that for economic consciousness is useful not only intuitive, but also realized practical logic, i.e. system of the scientifically developed means and methods of the conscious logic control of reasoning.

The subject should draw correct conclusions from general scientific positions to follow the scientific recommendations consciously. The practical logic, which serves as basis for it, is a system of rules, norms, and in case of need it is possible to get a new true knowledge from initial veritable knowledge using them. The fact is to realize and to improve practical logic, used for clear perception of economic relations.

The scientifically realized practical logic is system of control over expression of ideas and purposeful formation of thinking logicality and its general basic principle is accordance of logic knowledge to users' interests. Derivative principles are the following: interrelation between verbal component of thinking, images and practical actions; the most full mastering of logic forms of concepts, propositions, inferences and language expression of these forms; original, not imparted to the machine with the purpose of intuitive logicality forming, accomplishment of logic operations.

The principle of accordance to consumers' interests demands a choice of optimum means and methods, which give possibility to attain the certain result with the minimal expenses and to attain the maximum of results with the certain expenses. This principle is recognition that extreme principles work in economic activity as a whole and in its mental component in particular. For any mass logical economic thinking the realized logic, which is extremely relieved of unnecessary complications, is extremely approached to intuitively used logic.

In the first place, the practical logic of economic thinking is natural language's logic. Firstly, people use this language in comprehension of the economic reality and when they carry on business negotiations. Secondly, natural language is a language of economic science.

Free (consciously controllable) mastering of *all* logic natural language's means is necessary for optimal performance of economic thinking. But it doesn't exclude, of cause, that an artificial language can be used in addition to this in an economic science, for example, in sphere of mathematical modelling. Therefore, the practical logic of economic thinking can't be limited just by mastering of those forms of attributive propositions, which traditional logic courses offer.

In these courses traditional syllogistics is the closest discipline to logic of natural language. It considers just universal affirmative (***A***), particular affirmative (***I***), universal negative (*E*) and particular negative (***O***) propositions about properties and it establishes rules of formal inference only for them. In these courses the presence of allocating and excluding propositions is admitted, in spite of syllogistics. The traditional logic courses don't still instruct to supervise the information, transmitted by *all* logic forms of natural language's propositions.

It goes without saying, that intuitive thinking uses all natural language's logic means worse or better, but their development, use and connection with the certain meanings mostly are spontaneous and they aren't subject to the conscious control. There are 304 forms of attributive propositions about subjects only in the dictionary, developed by the author. Also the similar dictionaries of the forms of propositions about cases, places, times, points of view are offered. In these dictionaries the existential linear-tabular diagrams (ELTD), which give the information about existence or non-existence of elements with some attributes, are given.

It is not enough just to establish a fact that the classical logic doesn't observe to "intuition of logic consequence". It is necessary to clear up, what intuition is based on, what is considered to be such intuition, if the accuracy of inference or substantiation can be consciously proved to other people and, in turn, be realized by them, to rely on this intuition. And it's in condition that neither scientific economist nor, moreover, business partners for the most part didn't study any syllogistics or, and what is more, any symbolical logic. Nevertheless, opportunity of such proof in such condition exists. But this opportunity isn't created with presence of traditional syllogistics' rules or with methods of symbolical logic. It's created with people's ability to imagine pictorially, what actually speech is about, what information about the object is reported and, accordingly, what information can be taken from this not formalized basis in the consequence. On this basis Johnson-Lard, the representative of cognitive Psychology, opposed a semantic method to Logic [1]. However, this method, according to its subject, as a method of the correct construction of argumentations, is the logic method, and namely it's method of pictorial practical logic (method of pictorial logic semantics). Without doubt, it isn't a method only of the symbolical transformation of ones propositions in others, but it's a method of logic processing of the information, transmitted by image of meanings of these logic propositional forms. Johnson- Laird writes, that there is alternative theory, which is much easier, than the theory, offered by Newell, ("the theory based on the same general lines, which depends on the close relation between the Venn diagrams and the table of truth") and gives an example of application of this theory [1]. The quoted words in themselves specify a connection between his method and logic methods; and the example, resulted by him, reveals analogy of this method and the method of ELTD, offered us.

In offered pictorial practical logic [7], [8], [9] the conclusions are made on the basis of the direct account of the transmitted information; but it doesn't mean at all, that the rules of conclusion aren't used in them. These rules were written down symbolically by L. Carroll, and it doesn't contrary to the fact that people use these rules, but not formulas of them. The symbolical expressions in pictorial practical logic have only those meanings, which the appropriate images give them. Such image can be a perception of reality, a qualitatively similar representation about it, and a qualitatively dissimilar diagrammatic image of the relations between sets. The economic consciousness is connected with events in macrocosm. They are direct appeared in macro forms or, at least, they indirectly contact with sensual perception of their conditions, reasons and sequels. Otherwise, they can't be neither proved nor regulated.

The economic consciousness is called up to adjust such activity, where an image of desirable result and image of action leading to this result are necessary. In this activity the symbols should be connected with images.

Law of sufficient logical reason should be observed in economic thinking: just information, presented in reason, can be taken in consequence. Such understanding of the law of sufficient logical reason can be expressed by formula: $A \leftarrow A \vee (A \wedge B)$, where A and B – information, irrespective of the fact which propositional forms it is transferred by. The formula means: consequence with information A follows from the reason, which contains just the same or the same and additional information. All what is supposed by paradoxes of true and false propositions in classical logic is forbidden by such understanding of the law of sufficient logical reason; it is forbidden to see the logical reason in those propositions, which don't carry information contained in thesis, subjected to substantiation; it is forbidden to make any conclusions from false information, given by some subject; but it is allowed to allocate false information for refutation. The practical logic doesn't substitute the conjunction "If..., then...." by material implication, but namely this substitution conducts to paradoxes.

Sentences of some text by themselves at all don't contain information about object, which is real logical reason for conclusions. These sentences are informative propositions (i.e. propositions about reality) if only they due an image of valid object or indirect displays of its existence in details or as a whole. But also the images are true, merely if there is only that information in them (form liable to reflection), which is in reflected. It means, in the end, that only perception of object's details, kept as pictorial idea (besides, perception common for different subjects) is the original final logical reason for conclusion.

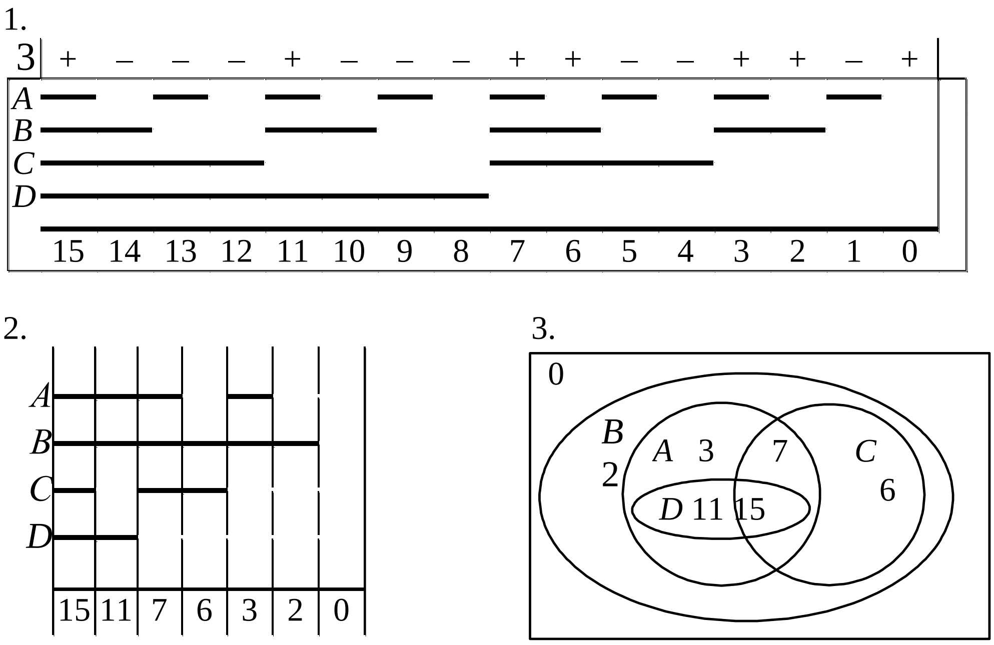
The transformation of the information into commodity value demands an avoidance of losses and distortion of information, transmitted by natural language's logic means. For achievement of unequivocal understanding of these means by different people in different conditions a proved normative pictorial definition of these means' meanings is necessary.

The interpretations, given to propositions (***A, E, I, O***) in the majority of formalized symbolical syllogistics, are different and mostly obviously artificial. As a result of adjustment under conformity to such artificial figure, as logic square there are such interpretations in language of predicate logic, which include material Implication. With such interpretation a simple categorical proposition ceases to be categorical, turns to complex conditional proposition or in proposition with logic "or" and it ceases to carry certain information about discussing case. For example, «Some goods (S) have no demand (P) ", actually, it is supposed to interpret so: «There are no goods (S) or there are goods which haven't a demand (*S* not-*P*)" {Writing down in the language of predicate logic: $\exists x\, S(x) \supset \exists x\, (S(x)\ \&\ \neg P(x))$, what's equivalent of $\neg\exists x\, S(x) \vee \exists x(S(x)\ \&\ \neg P(x)$ [6]}. Hardly any economist will consider it as the categorical proposition about presence or absence of goods. But what interpretation is not artificial? How other propositional forms must be interpreted? There is a need to answer these questions using sociolinguistic researches, because the problem at issue is a natural language as a mean of *mass* intercourse. It is possible to learn about words' meanings got owing to historical spontaneous process, only from people. To attribute to the words artificial meanings (by virtue of gnoseology or other reasons) means transformation of natural language in more or less artificial one.

It's hardly effective to impose the artificial meanings of words to mass of people. A validity criterion of ***A***, ***E***, ***I***, ***O*** and many other interpretations of propositional forms should be not arbitrary formation of syllogistic systems, even if they satisfy to these or those criteria of Symbolical logic, but the reference, firstly, to the practice of mass dialogue in natural language, and, secondly, to that level of thinking, on which illogicality is corrected by impracticability of actions, appropriate to wrong interpretation. At such reference the rules of logic act as component of symbol-representational models, appropriate to sensual experience and validity. Conformity to validity, as it is given in practical experience, becomes thus criterion of validity of logic constructions.

To find out meanings attached to logic means of natural language, the technique of research with using of questionnaire was developed and applied by author [9]. In this questionnaire the logic means of language correspond with all probable (allowable) variants of meanings, appropriate or inappropriate to these means, i.e. sentences with these means. Form of accordance of these meanings given in this questionnaire doesn't demand any special training. A respondent should answer what combinations of presence or absence of attributes correspond to the specified sentence, and what combinations don't correspond.

Reveal of character of relations between sets of discussed elements correspond to some language expression of logic proposition form, allows to find out, what information this expression carries, and to transfer this information with one existential linear-tabular diagram. (It's required more than one of Euler diagrams for demonstration of all opportunities corresponding to this or that language expression of the logic proposition form). Euler diagrams mostly are offered in textbooks, but using of tables as logic diagrams is considerably more productive. Any economist and overwhelming majority of population are accustomed to use and understanding of tables. However, construction of both Euler diagram and table is a result of some kind of precomputation. For such ELTD are optimal (see: the diagram 1 in the following complete set). It's possible to have a preparation of such diagram's linear part in electronic variant or in the form of logic rule. The sample of the diagrams of relations between concepts is given below: *A* – money; *B* – value; *C* – paper product; *D* – rouble.



4.

<table>
<tr><td colspan="7">All discussed</td></tr>
<tr><td colspan="6">B</td><td>not-B</td></tr>
<tr><td colspan="4">A</td><td colspan="2">not- A</td><td>not-A</td></tr>
<tr><td colspan="2">C</td><td colspan="2">not-C</td><td>C</td><td>not-C</td><td>not-C</td></tr>
<tr><td>D</td><td>not-D</td><td>D</td><td>not-D</td><td>not-D</td><td>not-D</td><td>not-D</td></tr>
<tr><td>15</td><td>7</td><td>11</td><td>3</td><td>6</td><td>2</td><td>0</td></tr>
</table>

5.

<table>
<tr><td colspan="7">All discussed</td></tr>
<tr><td colspan="6">B</td><td rowspan="4">not-B</td></tr>
<tr><td colspan="4">A</td><td colspan="2">not- A</td></tr>
<tr><td colspan="2">C</td><td colspan="2">not-C</td><td rowspan="2">C</td><td rowspan="2">not-C</td></tr>
<tr><td>D</td><td>not-D</td><td>D</td><td>not-D</td></tr>
<tr><td>15</td><td>7</td><td>11</td><td>3</td><td>6</td><td>2</td><td>0</td></tr>
</table>

Fig. 1.

Diagrams in this complete set on Fig.1 are: 1 – ELTD, linear-tabular diagram with image of obviously empty sets (completed with a logic ruler). {With the ruler the diagram is more convenient to draw on a clean sheet. The scale if this logical ruler is like a logical Marquand rectangular drawings which S. Lushchevska-Romanova improved and T. Kotarbinsky used [2] and [3]}; 2 – linear-tabular diagram without the image of obviously empty sets; 3 – Euler diagram complemented with image of all discussed (universe), i.e. with rectangle; 4 – obvious combination of the linear diagram and table; 5 – table. Usual, but basically not obligatory, difference between registration table and linear diagram of existence is: on the diagram not numbers are put, but marks of existence (for example, "+" instead of nonzero number, or "-" instead of zero).

The definition of common acceptable meanings of a language's logic means allows concluding, with a higher degree of probability, that the certain form of proposition carries such-and-such information. The fragment of the diagram dictionary of logic propositional forms about discussed subjects looks with use of ELTD like this:

B		*not-B*		
A	*not-A*	*A*	*not-A*	
+				There is *A B*. Some *A* is *B*. Some *B* is *A*.
+	+			Not only *A* (*not-A*) is *B*. Not each (every, all) *B* is *A* (not-*A*).
−				There isn't *A B*. No *A* is *B*. No *B* is *A*.
−		−		There isn't *A*. There isn't *A B* and there isn't *A* not-*B*.
+		−		Each (every, all...) *A* is *B*. // Only *B* is *A*.
+	−	−		Only each *A* is *B*. By definition, *A* is *B*.
−	+	+	−	Each, except *A*, is *B*. Each, except *not-A*, is *not-B*.
·		·		There is *A* (*B* or *not-B*).

Fig. 2.

Diagrammatic dictionaries of forms of propositional about cases, places (loci), times and points of view have an analogous kind. In such forms terms are the propositions (for example: "Always, when all, except *A*, is *B*, then any *C* is not *A*".). In representational construction of logic of natural language the proposition "If *A*, (then) *B*" ("In a case if *A*, (then) *B*") is interpreted as equivalent to proposition "there are no cases in which there is *A*, but there isn't *B*". It eliminates paradoxes of implication.

The diagrams of meanings of separate propositions and information of these diagrams (tables) can be combined in one diagram (table) of the reason. Such combination can make the new information. For a wide class of tasks the tabulation is the confirmed century practice, optimum on a ratio of availability and simplicity method of demonstration of logic following in economic reasoning. Linear diagrams are only graphic reductions of tables.

Below the inference rules are given. These rules of transformation are formulated in graphic (partially pseudo-symbolical) language of existential tables in which the linear diagrams are inscribed by fat lines. The existential tables for transfer of the economic and not only economic information in with the designation of existence (non-emptiness of sets) **is** «+»and the designation of non-existence (emptiness of sets) **is** «-» are usual enough and easily understood.

The inference rules of this tabular method are:

I. Rules of carrying of information from a partial *table-premise, or ELTD,* in the summary table, or ELTD, with additional discussed properties and additional splitting of columns:

1. If and only if there is *A*, then there is *A B* or *A not-B.*
2. If and only if there isn't *A*, then there isn't neither *A B*, nor *A not-B.*

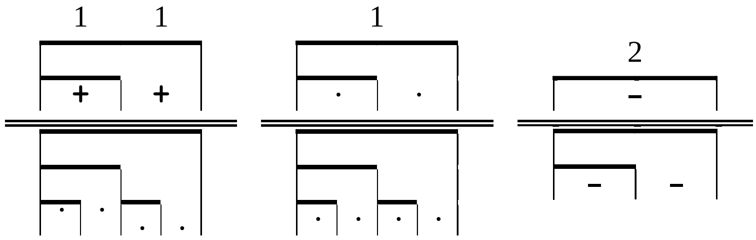


Fig. 3.

1. $\exists x\, A(x) \leftrightarrow \exists x\, ((A(x) \wedge B(x)) \vee (A(x) \wedge \neg B(x)))$
2. $\neg\exists x\, A(x) \leftrightarrow (\neg\exists x\, (A(x) \wedge B(x)) \wedge \neg\exists x\, ((A(x) \wedge \neg B(x)))$

II. Rules of association of information taken from partial tables-premises in the diagram of reason in the summary table:

3. If and only if there is *A*, then there is *A*.
4. If and only if there is *A* and there is *A*, then there is *A*.

5. If and only if there is *A* or *not-A* and there is *A*, then *A* is present.
6. If and only if there is *A* or *not-A* and *A* is not present, then there isn't *A*, and *not-A* is present.
7. If and only if there are *A*, *B*, or *C*, and there *A* is not present, then *A* is not present, and there is *B* or *C*.
8. If and only if there isn't *A*, then there isn't *A*.
9. If and only if there isn't *A* and there isn't *A*, then there isn't *A*.
(6 – 7. If and only if according even to one table-premise there is no *it*, in a result: *it* is not present).
10. If there is *A* and there isn't *A*, this is the contradiction which it is necessary to eliminate.
11. If there is *A* or *B*, and both *A* and *B* are not present, it's contradiction.
(10 – 11. If according to one premise it is present, and according to another it is not present, the data about its presence are contradictory).
12. If and only if there is *A* or *B* and there is *B* or *C*, then there is *A* or *B* and there is *B* or *C*.

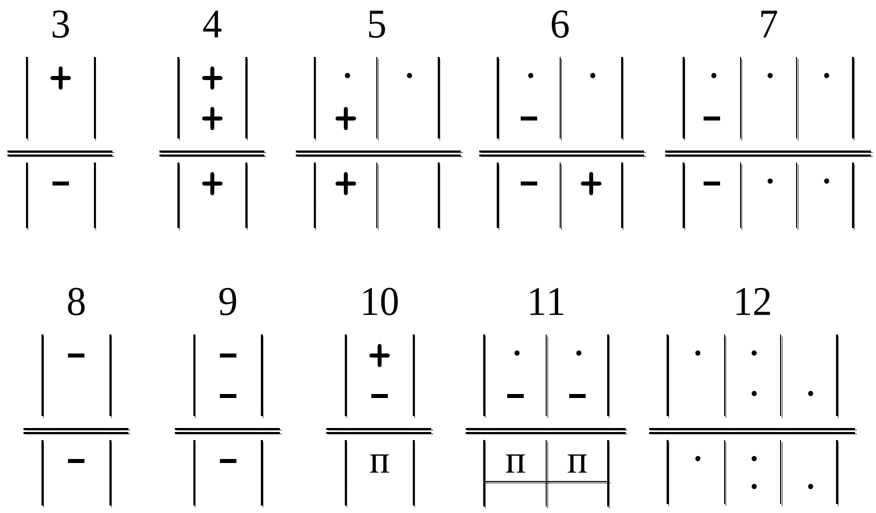


Fig. 4.

3. $\exists x\, A(x) \leftrightarrow \exists x\, A(x)$
4. $(\exists x\, A(x) \wedge \exists x\, A(x)) \leftrightarrow \exists x\, A(x)$
5. $(\exists x\, (A(x) \vee \neg A(x)) \wedge \exists x\, A(x)) \leftrightarrow \exists x\, A(x)$
6. $(\exists x\, (A(x) \vee \neg A(x)) \wedge \neg\exists x\, A(x)) \leftrightarrow (\neg\exists x\, A(x) \wedge \exists x\, \neg A(x))$
7. $(\exists x\, (A(x) \vee B(x) \vee C(x)) \wedge \neg\exists x\, A(x)) \leftrightarrow (\neg\exists x\, A(x) \wedge \exists x\, (B(x) \vee C(x)))$
8. $\neg\exists x\, A(x) \leftrightarrow \neg\exists x\, A(x)$
9. $(\neg\exists x\, A(x) \wedge \neg\exists x\, A(x)) \leftrightarrow \neg\exists x\, A(x)$
10. $\exists x\, A(x) \wedge \neg\exists x\, A(x) \rightarrow$ *contr.*, or $(\exists x\, A(x) \wedge \neg\exists x\, A(x) \leftrightarrow$ *contr.* $(\exists x\, A(x) \wedge \neg\exists x\, A(x)))$
11. $\exists x\, (A(x) \vee B(x)) \wedge \neg\exists x\, A(x) \wedge \neg\exists x\, B(x) \rightarrow$ *contr.*
12. $\exists x\, (A(x) \vee B(x)) \wedge \exists x\, (B(x) \vee C(x)) \leftrightarrow \exists x\, (A(x) \vee B(x)) \wedge \exists x\, (B(x) \vee C(x))$

On these diagrams "+" corresponds to any number, which greater of zero, and "**-**" corresponds to zero. The symbol of point can mean, for example, that it is known, how many *B* subjects are present, but it is not known, how many *C* and *not C* are among them. At numerical filling of the tables the numeric data can contradict itself only partially. For example, if according to one document there are 5X, and according to another there are just 3X about the same object, place, time and relation, the information only about 2X is contradictory:

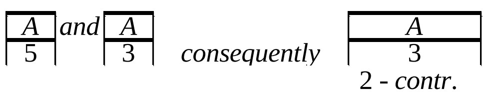


Fig. 5.

III. If the information of basis is not interesting, it is necessary to take out important information by transformation of initial table to the table – conclusion. It is made by the following rules:

13. Only if there isn't *A B* and *A not-B* is not present, *A* is not present. (If it isn't present neither *such* nor *not-such* [other], so it is not present).

14. If and only if there is *A B* or *A not-B*, then there is *A*. (If it is, such or not such, *it is*.)

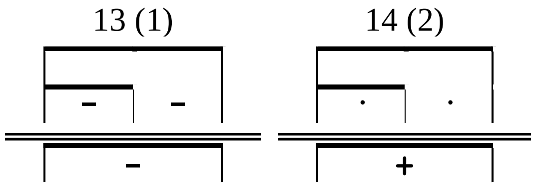


Fig. 6.

13. $\neg\exists x\,(A(x) \wedge B(x)) \wedge \neg\exists x\,(A(x) \wedge \neg B(x)) \leftrightarrow \neg\exists x\, A(x)$

14. $\exists x\,((A(x) \wedge B(x)) \vee (A(x) \wedge \neg B(x))) \leftrightarrow \exists x\, A(x)$

15. If there is *A B*, then there is *A*.

16. If at transformation "+" and "." get in one column, the above mentioned rule 5 works: if there is *A* or *not-A* and there is *A*, then there is *A*.

17. If there is (are) *A B*, then there is (are) *A B* or *A* not-*B*.

18. If there isn't *A*, then there isn't *A B*.

Below in diagrams 19 is shown action of rules 17 and 18 in the same times.

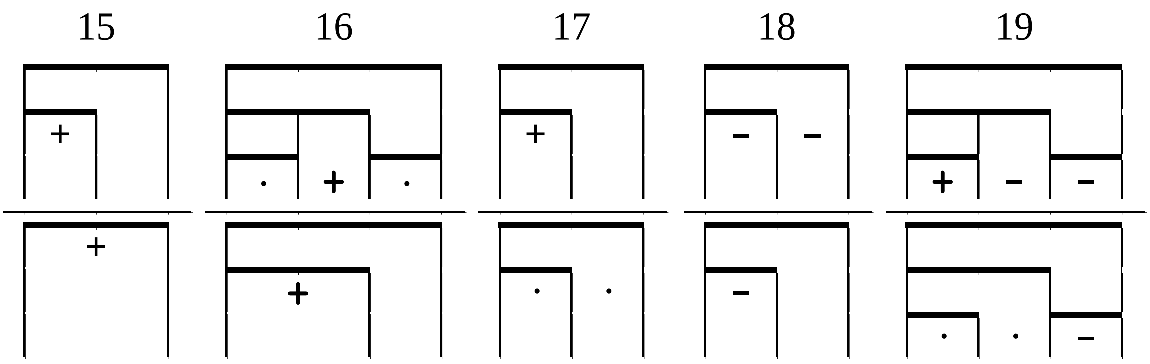


Fig. 7.

15. $\exists x\,(A(x) \wedge B(x)) \rightarrow \exists x\, A(x)$

16. See 5.

17. $\exists x\,(A(x) \wedge B(x)) \rightarrow \exists x\,((A(x) \wedge B(x)) \vee (A(x) \wedge \neg B(x)))$

18. $\neg\exists x\, A(x) \rightarrow \neg\exists x\,(A(x) \wedge B(x))$

Mainly, action of rules 6, 7, and also association of the information about not-existence give *the new* information. The full information which contains in the diagram of the reason on fig. 8, does not contain neither in any of premises, nor in their combination without application of inference rules. Deduction serves as a method of theoretical cognition.

Rules 1-9, 12, 13, 14 provide a conclusion without information loss such conclusion which is equivalent to the reason. Rules 15, 17, 18 provide a conclusions with a part of the information of the reason. Rules 10, 11 fix the information about what simplest propositions are contradictory. It in scientific thinking can be rather significant, as, for example, knowledge of that which denying of a postulate of Euclid's geometry differ Lobachevski's and Riman geometry. In this connection the rule 10 can be transformed to equivalence: $\exists x\, A(x) \wedge \neg\exists x\, A(x) \leftrightarrow$ *contradiction* $(\exists x\, A(x) \wedge \neg\exists x\, A(x))$.

Addition to the rules of tabular method: conclusion about subjects is correct, if its premises are propositions describing the same discussed case.

Diagrammatic systems could provide us with rigorous proofs [5]. Optimal construction of the logic of statistical tables is carried out in the language of linear-tabular diagrams. We illustrate the resolution of the method ELTD for example A.

Example A.

Below are four propositions-premises (the letters *A, B, C, D, E* – product names, or others) and proposition-conclusion:

Not each C^{1}not-D is ^{3}either A^{2}or C.
Each not-B^{4}not-D is ^{6} neither A^{5}nor C.
There is only^{7}not-D E.
All E, except not-B^{8}not-C, are$^{10}C^{9}B$.

There are *B C* not-*D E*, which not each are *A*, and there is not-*A* not-*B* not-*C* not-*D E*, and there is nothing else.^{11}

This is the inference-equivalence. We must prove that the reason (a combination of premises and applied rules of inference) is equivalent to a conclusion.

Separate diagrams for each operation are given to facilitate understanding of the solution in Fig. 8. They are obtained by substituting the required terms in those diagrams dictionary connectives and propositional forms, which determine the value of these operations.

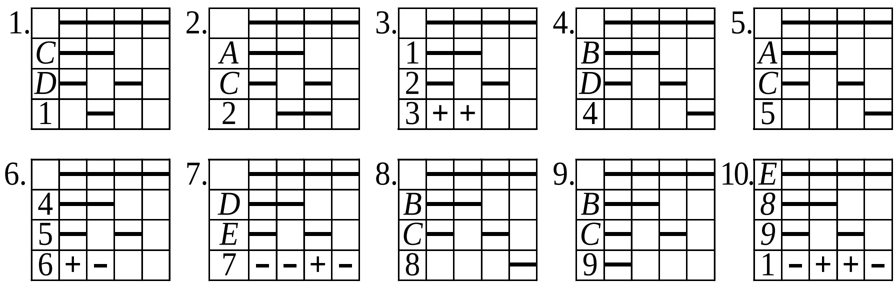


Fig. 8. Separate diagrams for operations.

Information of these diagrams at the following inference rules is transferred to the appropriate lines of the diagram in Fig. 9. This is a combined diagram premises, as well as reason and conclusions.

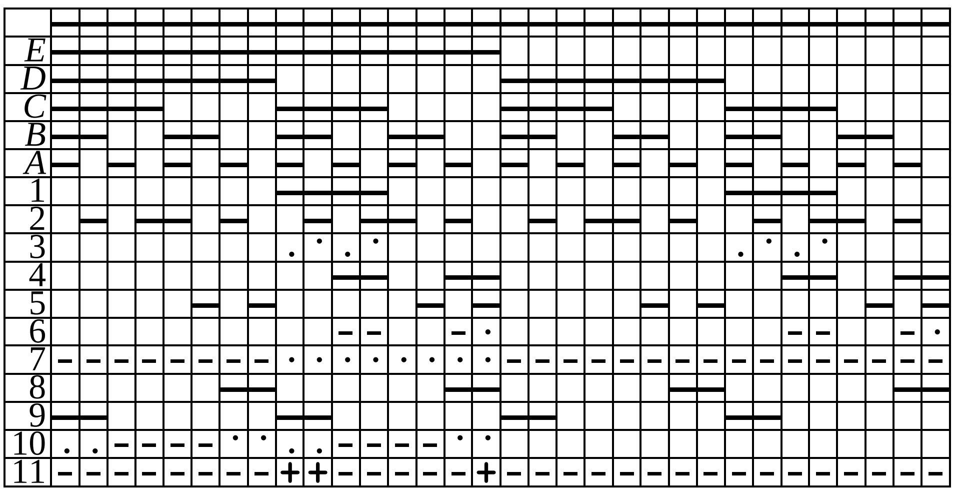


Fig. 9. The combined diagram premises, reason and conclusions.

The diagram in Fig. 9 is enough to record the construction and testing of such inferences. Even faster diagram is drawn, if the part with the letters *A*, *B*, *C*, *D*, *E* transferred to the blank which printed by printer or applied onto logical ruler

Below the above inference is written in the language of predicate logic with this interpretation of propositional forms that is fixed in the diagram dictionary:

$\exists x\,((C(x) \wedge \neg D(x)) \wedge (A(x) \vee\!\vee\, C(x))) \wedge \exists x\,((C(x) \wedge \neg D(x)) \wedge \neg(A(x) \vee\!\vee\, C(x))) \wedge \exists x\,((\neg B(x) \wedge \neg D(x)) \wedge (A(x) \downarrow C(x))) \wedge \neg\exists x\,((\neg B(x) \wedge \neg D(x)) \wedge \neg(A(x) \downarrow C(x))) \wedge \exists x\,(\neg D(x) \wedge E(x)) \wedge \neg\exists x\,\neg(\neg D(x) \wedge E(x)) \wedge \neg\exists x\,(E(x) \wedge (\neg B(x) \wedge \neg C(x)) \wedge (C(x) \wedge B(x))) \wedge \exists x\,(E(x) \wedge (\neg B(x) \wedge \neg C(x)) \wedge \neg(C(x) \wedge B(x))) \wedge \exists x\,(E(x) \wedge \neg(\neg B(x) \wedge \neg C(x)) \wedge (C(x) \wedge B(x))) \wedge \neg\exists x\,(E(x) \wedge \neg(\neg B(x) \wedge \neg C(x)) \wedge \neg(C(x) \wedge B(x))) \leftrightarrow \exists x\,(E(x) \wedge \neg D(x) \wedge C(x) \wedge B(x) \wedge A(x)) \wedge \exists x\,(E(x) \wedge \neg D(x) \wedge C(x) \wedge B(x) \wedge \neg A(x)) \wedge \exists x\,(E(x) \wedge \neg D(x) \wedge \neg C(x) \wedge \neg B(x) \wedge \neg A(x)) \wedge \neg\exists x\,\neg\,((E(x) \wedge \neg D(x) \wedge C(x) \wedge B(x)) \vee (E(x) \wedge \neg D(x) \wedge \neg C(x) \wedge \neg B(x) \wedge \neg A(x)))$

[$\vee\!\vee$ - “either... or…”(See Fig. 8, diagram 2); $\downarrow$ - “neither ... nor…”(See Fig. 8, diagram 5)]

As far as I know, there is no alternative theory of inference, which would suggest that the method allows for 10 minutes a man without a computer to prove or disprove this equivalence. A conclusion from several complex premises in natural language can be done by constructing a diagram more successfully than any symbolic methods. The condition of this success is building a new logical system, the theory of inference evidence. The basis of this theory is a new pictorial language.

Two-letter diagrams of individual operations can be not drawing, but necessarily to keep in mind.

If all the information of reason diagram is not reading in the form of relatively easy proposition as in this case, for each of the individual propositions of a complex conclusion we are building separate connective lines in an integrated diagram. We do not need to pencil such diagrams of the partial conclusions, and usually remember the areas from which the information is considered and extracted in conclusion, it is not difficult. As you develop solving skills to these problems an increasing number of operation scan be performed in the mind, and write the solution can be shorten. First detailed external models of doing any graphics, gradually more and more executed in his mind, become internal mental models. The diagrams as external representation become freely used internal mental representation.

Individual control of reasoning is necessary condition of subject’s independence, freedom and personal responsibility for substantiation of accepted decisions. Also it is training of intuitive logicality. Economic activity is documented in tables. In them the economic thinking has reliable enough logic means, which deserve to be studied regularly, to be improved, to be used consciously and to be passed to the next experts.

In some publications of last time an economic science is refused in status of exact science, in knowledge of the objective laws, and, therefore, in accomplishment of prognostic function, which is based on such knowledge. Other question is whom, where and when such withdrawal of economic science of its status is advantageous. Each subject of knowledge and any system of knowledge are doomed to imperfection and falseness of information about cognized object. In this sense there isn’t any distinction in kind between economic science and other sciences. There can be claims on the part of used empirical methods of reception of initial information and on the part of methods of the further theoretical information organization. One of the most important methods of theory is deductive logic with its semantic methods.

At the faculty of economics in BSU the practical logic is successfully read as a course for choice. It was developed by author, and it is oriented to professional training of economists. The last ten years, the author of this article gave a course of logic of choice for economists do not feel necessity to pass to reading of ‘informal logic’ or etc. In fact, I teach a course of image-bearing practical logic of natural language. Logical culture of this language should be high enough for any scientist, economist, lawyer and simply a businessman.

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