REMARKS ON ANCIENT CHINESE LOGIC

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ABSTRACT. Some works by a Polish sinologist Janusz Chmielewski (1916–1998) on logical aspects of argumentation in ancient Chinese philosophy are discussed. In the paper the Wade-Giles transcription of Chinese characters is used.

Introductory Remarks

The philosophical tradition of the West (Europe) and the East (India and China) have developed in separation. However, there are some interconnections and, consequently, there has been some influence of one tradition on the other. In this paper the reconstruction of argumentation styles present in ancient Chinese philosophy in terms of Western formal logic is in focus.

And it was Janusz Chmielewski who contributed considerably to this task:

> It was during the 1960s, when some scholars with a solid logical background began to write about logic in China, that Chinese logical tradition began to be interpreted in a way that could make sense to historians of logic in general. It is the considerable merit of Janusz Chmielewski to have acted on the insight that in order to study Chinese logic it is useful to know about Western formal logic. Janusz Chmielewski's *Notes on Early Chinese Logic* 1 to VIII (1962 to 1969) are the first sustained attempt to apply formal logic to Classical Chinese texts.[1]

Below, we refer to the above mentioned *Notes on Early Chinese Logic* published in *Rocznik Orientalistyczny*:

- Part I: **26**, no. 1 (1962), 7–22;

- Part II: **26**, no. 2 (1963), 91–105;

- Part III: **27**, no. 1 (1963), 103–121;

- Part IV: **28**, no. 2 (1965), 87–111;

- Part V: **29**, no. 2 (1965), 117–138;

- Part VI: **30**, no. 1 (1966), 31–52;

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[1] Joseph Needham, *Science and Civilisation in China*, vol. **7**, Cambridge University Press, Cambridge 1998. Part **I**: Christoph Harbsmeier, *Language and Logic*, 21–22.

- Part VII: **31**, no. 1 (1968), 117–136;

- Part VIII: **32**, no. 2 (1969), 83–103.

We also take into account two more papers by Chmielewski:

- Język starochiński jako narzędzie rozumowania (Archaic Chinese as a Tool of Argumentation), *Sprawozdania z prac naukowych Wydziału I Polskiej Akademii Nauk* **8**, 2, 1964, 108–133.

- Zasada redukcji do absurdu na tle porównawczym (*Reductio ad Absurdum* Principle in a Comparative Perspective), *Studia Semiotyczne* **XI**, 1981, 21–106.

The Polish Academy of Sciences prepares for publication Chmielewski works: Janusz Chmielewski *Language and Logic in Ancient China. Collected Papers on the Chinese Language and Logic.*, M. Mejor (Ed.) Komitet Nauk Orientalistycznych Polskiej Akademii Nauk, Warszawa 2009. Below, we occasionally refer to our preface to that edition.

By Ancient Chinese Logic we mean considerations present in *chu-tzu pai-chia* (*100 Schools*, $(-770, -221)$), in the *Springs and Autumns Period* $(-722, -481)$ and the *Warring States Period*, (the beginning of $-V, -221$):

- Lao Tzu $(-604?, -500?)$, Chuang Tzu $(-370, -301)$, the Taoists.

- Confucius $(-551, -479)$, Hsün Tzu $(-312, -230)$, classical Confucianism.

- Mo Tzu $(-470, -391)$, the Later Mohists.

- Hui Shi $(-IV)$, Kungsun Lung $(-325, -250)$, Sophists (or Dialecticians).

- Han Fei $(-280, -233)$, the Legalists.

Thus we exclude from our considerations the Chinese Buddhist Logic, developed much more later.

We are not going to add a separate list of references to the paper. The reader can find comprehensive bibliographies in eg.:

- Graham, A.C. 1978. *Later Mohist Logic, Ethics and Science.* The Chinese University Press and the School of Oriental and African Studies, London and Hong Kong.

- Graham, A.C. 1989. *Disputers of the Tao. Philosophical Argument in Ancient China.* Open Court, La Salle, Illinois.

- Hansen, C. 1983. *Language and Logic in Ancient China.* University of Michigan Press, Ann Arbor.

- Christoph Harbsmeier, *Language and Logic*, Part **I** in: Joseph Needham, *Science and Civilisation in China*, vol. **7**, Cambridge University Press, Cambridge 1998.

"Notes on Early Chinese Logic"

Janusz Chmielewski himself was not a professional logician. Nevertheless, he acquired logical knowledge far beyond the elementary level. He was able, then, to make a successful use of it in his sinological works. Chmielewski defines his methodology as follows (*Notes*, I, 8):

- to single out some more or less typical forms of reasoning occurring in the texts of early Chinese philosophers;

- to define them from the standpoint and in terms of elementary formal logic;

- to find out general logical laws and notions underlying them; and

- as far as possible, to compare them with the ancient logical theory of the West.

The reader can see a close similarity of this program to the one developed by Jan Łukasiewicz in his study of the Ancient Greek Logic.

In parts I and II of the *Notes* Chmielewski uses the classical propositional calculus, in parts III–VIII he uses — and this is in his times a real novelty in sinological works — the first order predicate calculus. Actually, in both cases he uses quantification over propositional variables as well as over propositional functions which might suggest that he is working in higher order logic, or in the full type theory. This manner of symbolization, however, should be understood in most places as belonging to the level of *metalanguage* and not the object language itself. It is only in part IV of the *Notes* (*Notes*, IV, 93ff), where the reference to higher order logic is really essential, when Chmielewski postulates some rules of translation between archaic Chinese language and the language of higher order logic. Similar remarks apply to his paper "*Reductio ad Absurdum* Principle in a Comparative Perspective".

There are several places in the *Notes* where Chmielewski — always very cautiously — compares his interpretations against the *contemporary* logical theory and thus he goes far beyond the ancient state of logic in the West, eg.:

- He notices the importance of the λ-*calculus* developed by Alonzo Church which recently has been commonly used not only in logic, but also in the construction of mathematical models of ethnic languages and in computation theory, as well as in general in theoretical information science (*Notes*, IV, 107).

- The same concerns *combinatory logic*, a system introduced by Moses Schönfinkel and being of special importance in the information science (*Notes*, IV, 108).

- He is aware of the special role played by the most important logic different from the classical one, i.e. by the *intuitionistic logic* (*Notes*, V, 118).

- When discussing the possibility of definition of general quantifier in terms of the so called zero quantifier Chmielewski enters (however without any reference to the classical papers by Andrzej Mostowski and Leon Henkin) the domain of *generalized quantifiers* which was advanced very vividly some years later. (*Notes*, V, 129–130).

- He notices the system of *positive logic*, without the functor of negation (*Notes*, V, 133).

- In part VII of the *Notes* Chmielewski refers to *modal logic*, when writing about a possible logical reconstruction of some of the Mohist Canons.

Parts I and II of the *Notes* deal with the so called *Chinese soriteses*. Here Chmielewski proposes a completely new, from the logical point of view, interpretation of those kinds of reasoning. He rejects the interpretation in syllogistic terms and claims, providing a convincing justification, that one should analyze the arguments in question in terms of the classical propositional calculus. The interpretation becomes simple and adequate. Let us consider one example:

1. *In order to obtain the kingdom there is a way:*

2. *If one obtains the people, one obtains the kingdom;*

3. *In order to obtain the people there is a way:*

4. *If one obtains the hearts of the people, one obtains the people;*

5. *In order to obtain the hearts of the people there is a way:*

6. *If one collects for the people what they like and does not impose on them what they dislike, [one obtains the hearts of the people].*

The logical structure of this argument is transparent — only 2, 4 and 6 are premisses, and the conclusion is implicit (a usual situation in Ancient Chinese argumentation):

Premiss 2:	$\gamma \rightarrow \delta$
Premiss 4:	$\beta \rightarrow \gamma$
Premiss 6:	$\alpha[\rightarrow \beta]$
(Implicit) conclusion:	$\alpha \rightarrow \delta$

Chmielewski is perfectly right using propositional calculus for the reconstruction of this argument.

Moreover, in Part I and Part II of the *Notes* one can find some general remarks illustrating Chmielewski's view on logic and its connection with language, which play an important role also in the remaining parts eg.:

- Several types of reasoning found in the texts of ancient Chinese philosophers much more are examples of *persuasion procedures* (and thus a special kind of *argumentation*) than examples of (more or less formal) *proofs*. Chinese logic, in full accordance with the spirit of (several branches of) Chinese philosophy has much more *pragmatic* character than Western logic.

- Reconstruction of forms of reasoning (arguments) should be conducted in a reasonable way: sometimes an argument contains pleonastic premisses which should be excluded from the reconstruction. The same concerns conclusions — it often happens that an argument is elliptic: the conclusion is omitted as obvious.

How to deal with enthymemes is, of course, well known. One should also not forget that the arguments of ancient Chinese philosophers were often based on metaphor — it was not the literal meaning of the words used in the argument which accounted towards the proper understanding of it. To sum up, the linguistic shape of an argument is often not sufficient to its logical reconstruction, sometimes also several pragmatic factors should be taken into account.

- The concept of *truth* is much more *epistemological* than logical (*Notes*, II, 97). Actually, in the logical reconstructions in question sometimes it is much more proper to talk about *admissibility* of the premises or conclusion than about the problem whether they are true or false. In general, Chmielewski observes that ancient Chinese philosophers do not commit many drastic logical mistakes (from the point of view of modern logic). Sometimes, however, they are committing epistemological fallacies. Of course, there are also some purely logical mistakes in the analyzed texts: eg. Mencius does not observe the asymmetry of implication.

- Chmielewski distinguishes between *implicit* and *explicit* logic. As far as I can follow him, this distinction corresponds to some hidden, yet to be recovered, rules of argument in contraposition to transparent cases, where the underlying rule is well recognized. My impression is that Chmielewski did believe in the existence of ***the*** logic: most likely, the first order predicate logic. Hence he could be counted, if I am not mistaken, as adhering to the First Order Thesis, which is currently so vividly discussed by philosophers of logic.

- I can bet that a very few logicians (if any) are aware of the fact that not all Boolean propositional functors have lexical exponents in any ethnic language. This is the case with archaic Chinese, as Chmielewski demonstrates (*Notes*, II, 104). In archaic Chinese there was no direct way to express the functor of *alternative*. Thus, instead of the direct construction $\alpha \lor \beta$ in archaic Chinese we find equivalent to it, but indirect constructions of the form $\neg\alpha \to \beta$.

Parts III and IV of the *Notes* are devoted to the analysis of the Mohist logic. Chmielewski proposes a logical structure of the Mohist *hiao*: it is a generally quantified implication, thus a formuła of the shape $\forall x\ (\varphi(x) \to \psi(x))$. This suggestion is not without some reservations: implication in archaic Chinese logic might have an intensional character. Hence may be in the reconstruction one should rather use a *strict implication* (belonging to modal logic) than *material implication* (belonging to classical logic). Moreover, the arguments involving *hiao* refer to *causal* relationships (with the word *ku*, "reason, cause"). The formula:

$$\forall x\ (\varphi(x) \to \psi(x)) \to (\varphi(a) \to \psi(a)),$$

where a is an individual constant, is a tautology of the predicate calculus. It corresponds, says Chmielewski, to certain Mohist arguments. But it is only an approximation of them: the first occurrence of an implication sign $\to$ should be perhaps replaced by strict implication, while the second occurrence of the same sign should be replaced by a functor corresponding to a causal relationship. Needless to say, such pedantry

would result in an extremely complicated logical formula. But already the first approximation — done in the first order classical predicate calculus — explains a lot, as far as Mohist arguments are concerned. Consequently, Chmielewski's interpretation shows that the Mohists did operate with a sophisticated logical machinery. Obviously, there was nothing close to a *logical system* comparable with that of the Stoics. However, one can find some cases of an *appropriate* (!) use of complicated logical patterns.

In the Parts referred to one can also find some original and justified observations about connections between languages of logic and ethnic languages. We can appreciate Chmielewski's overwhelming knowledge of the archaic Chinese language. He points out that such factors as eg. the lack of inflection, monosyllabic structure of words, the lack of "parts of speech", the system of writing, etc. surely influenced the *implicit* logic of the disputes of ancient Chinese philosophers. It follows without doubt that these features influence "the logic of the man on the street" as well. Chmielewski offers some remarks concerning "logical thinking" (*Notes*, IV, 108). Let me add that one can find more his remarks on this topic in the two his Polish papers mentioned above.

Also in parts V and VI of the *Notes*, devoted to selected logical laws (the principle of double negation, the law of contradiction, the law of excluded middle, etc.) we find an interplay between language and logic. Chmielewski pinpoints places (eg. Mohist Canons) where ancient Chinese philosophers made use of these laws. He also discusses different roles played by several (!) negations in archaic Chinese as well as by universal and restricted quantifiers and the zero quantifier.

The logical heritage of the Later Mohists is, undoubtedly, the most developed piece of the Ancient Chinese Logic. The *Dialectical Chapters* of *Mo Tzu* contain not only logical but many methodological and epistemological issues as well. We find there definitions and statements arranged in a well designed order. Thus, we find, eg.:

- six definitions concerning descriptions;

- thirty three definitions concerning action;

- twelve definitions concerning knowledge and change;

- eighteen definitions concerning geometry;

- six definitions concerning debating.

The purpose of logical analysis is characterized in *Mo Tzu* (Harbsmeier 1998, 330) as follows:

> The purpose of logical analysis is (1), by clarifying the distinction between right and wrong (*shih fei*), to inquire into the principles of order and misrule; (2), by clarifying points of sameness and difference, to discern the patterns of names and objects; (3), by settling the beneficial and the harmful, to resolve confusion and doubts. Only after that may one by describing summarize what is so of the myriad things, by sorting seek out comparables in the multitude of sayings.

Let us quote, after Harbsmeier 1998, 330–345, a few examples of Canons (with explanations). We are not going to comment on them; the interested reader can find a detailed discussion of the matter in the monographs by Graham (*Later Mohist Logic, Ethics and Science*) and Harbsmeier quoted at the beginning of the paper.

- Canon: *The 'reason'* (ku) *is (such that) if and only if something has got it, it will come about.*

  Explanation: *Minor reason: having this, it will not necessarily* (pi) *be so. Lacking this, it will necessarily* (pi) *be so...*

  Major reason: having this, it will necessarily be so. Lacking this, necessarily (pi) *it will not be so... (A1)*

- Canon: *Names* (ming) *are unrestricted, classifying or privative.*

  Explanation: *'Thing' is unrestricted. Any object necessarily* (pi) *requires this name.*

  Naming something 'horse' is classifying. For 'like the object' we necessarily (pi) *use this name.*

  Naming something 'Jack' is privative. This name stays confined in this object... (A78)

- Canon: *If you know* kou *(dogs), to say of yourself that you do not know* chhüan *(dogs) is a factual mistake* (kuo).

  Explained by: identity of objects.

  Explanation: *If the knowing of* kou *(dogs) is identical with the knowing of* chhüan *(dogs), then there is a mistake. If there is no identity, there is no mistake. (B40)*

- Canon: *The standard* (fa) *is that in being like which something is so.*

  Explanation: *The mental picture* (i), *the compass, a circle, all these may serve as standard* (fa). *(A70)*

- Canon: *By learning we add something (to our knowledge).*

  Explained by: the objector himself.

  Explanation: *He considers that learning does not add anything and accordingly informs the other. This amounts to causing the other to know that learning does not add anything, i.e., it amounts to teaching.*

  If one believes that by learning one does not add anything, then it is inconsistent to teach. (B77)

- Canon: *Non-existence does not necessarily* (pi) *presuppose existence.*

  Explained by: What is referred to.

  Explanation: *In the case of non-existence of something, the thing has to exist before it is in this way non-existent. In the case of the non-existence of the sky's falling down, it is non-existent without ever having existed. (B49)*

- Canon: *'All'* (chin) *is none not being so.*

  Explanation: *Something is fixed of all* (chü) *of them. (A43)*

  As for 'some' (huo), *it is 'not all'. (No 5)*

In parts VII and VIII Chmielewski is occupied with the concepts of *similarity* and *difference*. He stresses some difficulties in search of purely logical definitions of these concepts. In this critical approach he is obviously right. But the following remark should perhaps be added. Similarity and difference (or better, similarity and *opposition*) are not logical terms. *Identity* (and its negation, i.e. *diversity*) may be considered as logical *constants*, in Alfred Tarski's sense.[2] But similarity and difference (or opposition) are much more *ontological* (and to some extent also *epistemological*) terms. It follows that

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[2]Cf. Alfred Tarski, What are logical constants? *History and Philosophy of Logic* **7**, 1986, 143–154.

one should first built *mathematical representations* of similarity (sometimes also called *tolerance*) and difference (opposition) and only then investigate logical properties of these representations. This is my conjecture, open to discussion and criticism.[3]

In his *Notes* Chmielewski proposes his own explication of the famous White Horse Paradox by Kungsun Lung:

- A. Is it admissible that "a white horse is not a horse (*Pai ma fei ma*)?"
- B. It is admissible.
- A. Why should be so (*ho tsai*)?
- B. 'Horse' is that by which we name the shape. 'White' is that by which we name the colour. Naming the colour is not (the same as) naming the shape. Therefore I say: "'white horse' is not (the same as) 'horse' (*Pai ma fei ma*)."

(translation of this fragment: Harbsmeier 1998, 304).

Chmielewski's explication is done in terms of set theory, similarly to the solution proposed by: H. Greniewski i O. Wojtasiewicz, "From the history of Chinese logic", *Studia Logica* **IV**, 1956, 241–243). There already exists a huge literature on this paradox which, for the limitation of the space, will not be reported here. Let us only mention that the proposed solutions are connected eg. with:

- the problem of validity of synthetic statements (cf. eg. Antisthenes views);

- the problem of universals: *White-horseness is not horseness.*;

- a possible consideration of mass-terms: *White-horse-stuff is not horse-stuff.*

"Archaic Chinese Language as a Tool of Argumentation"

This paper is devoted to a very subtle analysis of just one example of argumentation, from chapter 26 of *Mo Tzu*[4]:

> (1)(a) If there is righteousness in the world, there is life; if there is no righteousness, there is death. (b) If there is righteousness (in the world), there is richness; if there is no righteousness, there is poverty. (c) If there is righteousness (in the world), there is order; if there is no righteousness, there is disorder. (2)(a) [Now,] Heaven desires life in the world and abominates death. (b) (Heaven) desires richness in the world and abominates poverty. (c) (Heaven) desires order in the world and abominates disorder. (3) (Hence I know that) Heaven desires righteousness (in the world) and abominates unrighteousness.

Before the logical analysis of this argumentation, writes Chmielewski, one has to conduct a semantic analysis of it. The first step in the latter is an association of formal symbols to particular Chinese characters corresponding to lexical items:

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[3]Some modest proposals concerning mathematical models of similarity and opposition can be found eg. in: Jerzy Pogonowski, *Tolerance spaces with applications to linguistics*, Adam Mickiewicz University Press, Poznań 1981 and, by the same author, *Linguistics oppositions*, Adam Mickiewicz University Press, Poznań 1993.

[4]Translation from Chmielewski's Polish original is mine.

A	Heaven
B	below
A-B	the world (= below Heaven)
C	there is
D	righteousness
E	implication particle
F	life
G	there is not
H	death
I	richness
J	poverty
K	order
L	disorder
M	to desire
N	possessive particle (3 singular)
O	conjunction particle (adversative)
P	to abominate
R	negation particle

After such an association we obtain the following schema representing this argumentation:

(1)	(a)	A-B	C	D	E	F		G	D	E	H
	(b)		C	D	E	I		G	D	E	J
	(c)		C	D	E	K		G	D	E	L
(2)	(a)	A		M	N	F	O	P	N	H
	(b)			M	N	I	O	P	N	J
	(c)			M	N	K	O	P	N	L
(3)				A	M	D	O	P	R	D

A commentary concerning this schema is in order:

- The elements: A and A-B correspond to arguments (terms); all the remaining elements correspond either to logical constants or to predicates.

- Complexes built in a symmetric and paralel way are separated in (1a)–(1c).

- In (1a)–(1c) conjunction is expressed by mere juxtaposition; in (2a)–(2c) conjunction is expressed by the particle O.

- It is syntactic structure of the text which enables us to distinguish premisses and conclusion in it.

We can start the logical analysis proper now. Some more remarks, however, are necessary:

- Adding C to any lexical item does not change the semantic value of the latter. Thus, eg. CD and D mean the same. The element C is introduced for stylistic reasons only.

- G expresses negation. A similar role is played by R (which occurs here only once).

- Elements D, F, H, I, K and L correspond to one-place first order predicates. Elements M and P correspond to two-place predicates of higher order with different kinds of arguments.

- One has to remember about a strong tendency in archaic Chinese (in the philosophical texts) to use antonyms. In particular, antonyms frequently replaced negations of terms and predicates. In the case just analyzed we have the following pairs of antonyms:

$$F — H \quad I — J \quad K — L \quad M — P$$

Chmielewski observes that considering one element of such a pair as the negation of the other does not lead to wrong solutions and he accepts this point of view while interpreting antonyms in this example.

- The possessive particle N points at the argument A-B.

We can now begin a "translation" of the above argument into the language of (higher order) logic. First, we associate individual names (a and b), first order predicates (ψ_1, ψ_2, ψ_3), second order predicate (Φ) and logical constants (negation $'$ and implication $\rightarrow$) with the symbols used in the former semantic analysis:

F	—	ψ_1
H	—	ψ_1'

A-B	—	a		(C)D	—	φ
A	—	b		GD	—	φ
N	—	a		RD	—	φ

I	—	ψ_2
J	—	ψ_2'
K	—	ψ_3
L	—	ψ_3'

M	—	Φ
P	—	Φ'

In result, we obtain the following representation of the argumentation in question (Chmielewski writes a one-argument first order predicate before its argument and a two-place second order predicate between its arguments, $\wedge$ denotes conjunction):

(1)	(a)	$(\varphi a \rightarrow \psi_1 a) \wedge (\varphi' a \rightarrow \psi_1' a)$
	(b)	$(\varphi a \rightarrow \psi_2 a) \wedge (\varphi' a \rightarrow \psi_2' a)$
	(c)	$(\varphi a \rightarrow \psi_3 a) \wedge (\varphi' a \rightarrow \psi_3' a)$
(2)	(a)	$(b\Phi\psi_1 a) \wedge (b\Phi'\psi_1' a)$
	(b)	$(b\Phi\psi_2 a) \wedge (b\Phi'\psi_2' a)$
	(c)	$(b\Phi\psi_3 a) \wedge (b\Phi'\psi_3' a)$
(3)		$(b\Phi\varphi a) \wedge (b\Phi'\varphi' a)$

We recall that antonyms are replaced by negations of the corresponding elements. It is evident that conditions (1a)–(1c) can be replaced by suitable equivalencies, and hence we obtain (here $\equiv$ is the equivalence symbol):

$$
\begin{array}{lll}
(1) & \text{(a)} & \varphi a \equiv \psi_1 a \\
    & \text{(b)} & \varphi a \equiv \psi_2 a \\
    & \text{(c)} & \varphi a \equiv \psi_3 a \\
(2) & \text{(a)} & (b\Phi\psi_1 a) \wedge (b\Phi'\psi_1' a) \\
    & \text{(b)} & (b\Phi\psi_2 a) \wedge (b\Phi'\psi_2' a) \\
    & \text{(c)} & (b\Phi\psi_3 a) \wedge (b\Phi'\psi_3' a) \\
\hline
(3) & & (b\Phi\varphi a) \wedge (b\Phi'\varphi' a)
\end{array}
$$

Now, it is clear that the argument contains elements which are redundant from the logical point of view. Each of the pairs:

$$(1a)–(2a) \quad (1b)–(2b) \quad (1c)–(2c)$$

has the same "deductive power" as all the premisses taken together. The redundancy is the result of stylistic effects chosen for persuasive reasons only. Thus, the above schema is equivalent to any of the schemes below, where $i = 1, 2, 3$:

$$
\begin{array}{ll}
(1) & \varphi a \equiv \psi_i a \\
(2) & (b\Phi\psi_i a) \wedge (b\Phi'\psi_i' a) \\
\hline
(3) & (b\Phi\varphi a) \wedge (b\Phi'\varphi' a)
\end{array}
$$

In the presence of standard assumptions concerning the logic used (eg. that the substitutivity *salva veritate* does not destroy the validity of the rules of inference) the schema itself is certainly valid.

Let us mention that Chmielewski was not interested in any metalogical problems concerning Ancient Chinese logic. This, of course, is justifiable: we do not deal here with a *system* of logic. The only thing we are analyzing are separate arguments.

"*Reductio ad Absurdum* Principle in a Comparative Perspective"

Chmielewski calls *Reductio ad Absurdum* Principle the following law of the classical propositional calculus:

$$(p \to \neg p) \to \neg p.$$

This law is also called the (weak) Clavius law. The name "Reductio ad Absurdum Principle" can be found in *Principia Mathematica*, where it is paraphrased (page 104): "if p implies its own falsehood, then p is false". Let us recall that the law in a sense converse to it, i.e.:

$$(\neg p \to p) \to p,$$

is also called the (strong) Clavius law.

The reader should admire Janusz Chmielewski for his many-sided talents: a chosen logical principle is investigated in a wide comparative perspective, including the system of logic developed in Ancient Greece, logical and epistemological investigations in Indian Buddhist logic and logical and philosophical reflection in Ancient China. In

addition to general remarks concerning antinomies and the principle in question in the texts of the mentioned three cultures we find also here some deep observations concerning the transfer of logical knowledge (in West and East) as well as some very interesting details, eg. claims about quantification of the predicate in ancient Chinese, supported with evidence.

We are not going to report on all Chmielewski's achievements and claims contained in his paper. Let us only mention that he is mainly concerned with the analysis of the well known paradoxical statement that all statements are false. This paradox was known to Greek philosophers: one can find it already in Xeniades from Corinth, Plato, Aristotle and Sextus Empiricus. Chmielewski provides his own translation of the argument found in *Mo Tzu* which has exactly the same structure. We quote Harbsmeier translation of this argument (cf. Harbsmeier 1998, 345):

> *Canon*: To claim that all saying contradicts itself is self-contradictory.
>
> Explained by: his saying (this).
>
> *Explanation*: To be self-contradictory is to be inadmissible. If these words of the man are admissible, then this is not self-contradictory, and consequently in some cases saying is acceptable. If this man's words are not admissible, then to suppose that it fits the facts is necessarily ill-considered (B71).

Chmielewski analyzes this fragment carefully, discussing also some others translations of it. He also considers a possibility of a logical reconstruction of the argument with the use of quantifiers (because we are concerned here with *all* statements).

Let us also add that the Later Mohists were fully aware of the self-reflexive paradoxes concerning truth and falsehood (cf. Harbsmeier 1998, 344):

> *Canon*: To reject denial is inconsistent.
>
> Explained by: he does not reject it.
>
> *Explanation*: If he does not reject the denial (of his own thesis that the denial is to be rejected) then he does not reject the denial. No matter whether the rejection is to be rejected or not, this amounts to not rejecting the denial (B79).

Chmielewski discusses also explications of the above paradox present in some Buddhists' texts, Indian as well as Tibetan. He stresses the connections of these explications with some epistemological assumptions accepted in Buddhists' doctrines.

Final Remarks

The paper is by no means a complete exposition neither of Janusz Chmielewski's works nor of the Ancient Chinese Logic in general. The present author does not claim to be competent in Ancient Chinese Logic, he plainly reads about it from time to time. Some work on the subject has been done in his Department of Applied Logic, Adam Mickiewicz University in Poznań, Poland:

- Anna Uryasz-Majewska, Wybrane podstawowe pojęcia starożytnej logiki chińskiej (Selected basic notions of the Ancient Chinese Logic), *Investigationes Linguisticae* **III**, 1998, Institute of Linguistics, Adam Mickiewicz University, Poznań, 91–188. M.A. Thesis defended in 1991; supervisor: Jerzy Pogonowski.

- Sławomir Sikora, Dialog o białym koniu (Bai Ma Lun) — metodologiczne problemy badań porównawczych logiki chińskiej i zachodniej (*The White Horse Dialogue* — the methodological problems of the comparative research of Chinese and Western logic), *Investigationes Linguisticae* **XIV**, 2006, Institute of Linguistics, Adam Mickiewicz University, Poznań, 97–110.

I think that Chmielewski's work is worth of further study by logicians interested in the history of logic. The reasons for that are numerous, eg.:

- Chmielewski's *Notes on Early Chinese Logic* give us examples of a fruitful application of tools used in mathematical logic to the study of reasoning conducted in an ethnic language, in addition in a language from outside the sphere being in focus of interest of the modern mathematical logic.

- *Notes* are waiting for the elaboration of some problems only marginally noticed by Chmielewski, problems which were in a sense anticipated by him, and which are of paramount importance in the construction of mathematical models of language.

- One can hardly find anything comparable to the analysis given in "Archaic Chinese Language as a Tool of Argumentation". It can be, without hesitation, recommended as a pattern of investigation in the logical analysis of ethnic languages.

- Also Chmielewski's analyses in "*Reductio ad Absurdum* Principle in a Comparative Perspective" are worth to be recommended. One may think of a research programme concerning the list of logical laws and rules of inference present in different cultures, conducted along the lines proposed by Chmielewski.

Let us stress one point in connection with the last of the above remarks. I am personally strongly against any speculations about the so called *logical relativism*. Different cultures may have different epistemological attitudes. But as far as logic itself is concerned, there is no such diversity. First, let us make clear what we mean by *logic* here:

<div align="center">

Logic is a systemized set of valid schemes of inference.[5]

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All terms occurring in this definition have precise mathematical definitions. Thus, we can always decide whether a given argumentation (in a given ethnic language) is conducted according to some valid rule of inference. One may find a rich inventory of arguments in, say, philosophical texts originated in one culture compared with a relatively small amount of them in a distinct philosophical tradition. But this, by no means, is a proof that one culture uses a different logic than the other one. When it comes to an evaluation of arguments, we always rely on logic in the sense of the definition given above.

One may think of a hypothetical culture which has developed, say, a system of intuitionistic logic and never "thought" of classical logic as the basis for arguments. The same may concern eg. modal logic, many-valued logic or even some sort of infinitary

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[5]Witold A. Pogorzelski, *Notions and theorems of elementary formal logic*, Białystok, 1994, 222.

logic. But still, all such allegedly culture-dependent logics are (in the strictly defined sense) comparable with classical logic.

Such a discipline as *ethnologic* is, in my opinion, not only imaginary, but indeed without any real subject (in contraposition, of course, to such well-established disciplines as ethnolinguistics or anthropology of culture).

The results obtained by Chmielewski strongly support the above thesis. Arguments found in the texts of Ancient Chinese philosophers can, without exception, be reconstructed in terms of modern formal logic. I think that Chmielewski's results support also the opinion expressed by Pogorzelski:[6]

> The question whether logical rules are not only true but, moreover, necessary, is far-reaching. It is connected with the question whether logic different from classical logic (not subclassical) is possible. [...] In other words, is a "different logic" conceivable? The fact that it does not seem to be possible (contrary to the fact that for instance "different physics" is conceivable) indicates the existence of compelling categories of interpreting the world. One can obviously wonder whether these categories are innate (compare Łukasiewicz: logical rules are made by the creator of the world) or if making propositional structures, which are used to describe the reality, imposes logic in one and compelling way.

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[6]Witold A. Pogorzelski, *Notions and theorems of elementary formal logic*, Białystok, 1994, 223.