Computer Science is not a science,
but a shop
(Don Chamberlin)

THE FORGOTTEN QUOTATION MARKS

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Preface

The author made the experience that an intricate, basic philosophical terminology is best presented by adopting Wittgenstein's aphoristic style. And in Wittgenstein's sense the following pages show how little is achieved when these terminological problems are solved. The word "forgotten" notifies that nothing is new in this paper. Almost everything can be found in encyclopedias. The author owes much to J. Mittelstraß (ed.): "Enzyklopädie, Philosophie und Wissenschaftstheorie".

Schema and Instances

1. A schema represents universal, an instance singular aspects of an object. Instead of 'schema' and 'instance' the terms 'type' and 'token' are used. If 8 is a token, then integer may be its type.
1.1. A schema is recognized. An instance is generated. Therefore a relation named 'instance_of ' is asymmetrical.
1.2. Schema and instances are expressed in dialogue (Kuno Lorenz). An active person A generates an instance in a single action. A passive person B recognizes the schema. In other terms: B understands A. Or: An instance is understandable as a singular (particular) of a schema.
1.3. In business: An instance may be ordered, but a schema is subscribed.

Descriptions and Models

2. A model is a description of something. $\ddot{x} = g$ is a model of the free fall. Models and descriptions are treated synonymously. In spite of this generality, prescriptions (moral and ethics) are excluded from modeling.
2.1. A description may be made by <u>using</u> actively sequences of symbols as instances. Or a description may be made by <u>mentioning</u> an already generated sequence of symbols as schemata. In the first case the model is called a model on an object language level (<u>use</u>-level, first language level, object model). In the second case the model is called a model on a meta-language level (<u>mention</u>-level, second language level, meta-model).
2.2. From an elementary point of view sequences of symbols are applied in two ways. Once a description (denotation) takes place to refer to an object symbolically. The sequence of symbols is then called a name or a definite description, e.g.'the capital of France' for the name 'Paris'. The general term for both 'names' and 'definite description' is called 'nominator'. The other way of applying sequences of symbols is to assign properties to referred objects. The term 'predicator' was introduce to denote properties. 'Objects' and 'properties' are terms on the same logical level.
2.3. If not an object on the first language level is referred to, but rather a generated sequence of symbols is mentioned on the second language level as a schema, then the sequence of symbols as a nominator has to be put within quotation marks (Frege) to indicate a schema of symbols. Quotation marks are name-forming operators. Predicators assigned to a schema are called meta-predicators.
2.4. If a sequence of given (lat: data) symbols is analysed logically, then the most fundamental issue is to decide whether a sequence of symbols is a nominator or a predicator. In a second logical step the

assignment of predicators to nominators has to be exhibited. A copula sign 'ε' is introduced to denote assignment or predication.

2.5. The most elementary data model (description of symbols) is of the form

$$N \varepsilon P$$

where the schematic symbols *N* and *P* are representing a nominator and a predicator, resp. Schematic symbols indicate the availability of nominators and predicators on the object level. Traditionally they are not put within quotation marks, although they are on the second language level. 'ε' is thought to be on the first language level. Because of this mismatch the logician Quine preferred the notation

$$\ulcorner N \varepsilon P \urcorner$$

to indicate two language levels in one expression.

$\ulcorner N \varepsilon P \urcorner$ is called an elementare sentence (syntactically) and an elementary proposition (semantically). Quine calls $\ulcorner N \varepsilon P \urcorner$ a quasi-quotation in the sense that in a first step *N* and *P* are replaced by a nominator and a predicator from the object level, and in a second step the copula is put between them. The copula is not a relation but an assignment symbol sui generis (Wittgenstein).

The most complicated data models are grammars of natural languages. Sentence patterns are simplifications of grammars.

2.5.1 The relational data model is of an extended elementary form.

$$\ulcorner N, P \varepsilon R \urcorner$$

N stands to *P* in a property called relation *R*. *N* and *P* are a composite nominators which in turn may be composed of elements: $N = N1, N2, ..., Nm$ and $P = P1, P2, ..., Pr$. This is an intensional definition of the relational model (see Wittgenstein T. 3.1432). Conventional notations, not exhibiting the intensionality, are

$$N\,R\,P$$

and $$R(N, P).$$

Example: ***R* = Order, *N* = Order#, *P* = OrderQty**

Order#, OrderQty ε Order

and ***R*(Order#, OrderQty)**

are two notation of a relational schema.

An extensional definition of a relation:

$$R\,(N, P) \subseteq N \times P$$

2.5.2 All data models are meta-models. Meta-data models are meta-meta-models.

2.6 Since one may talk about talking and may not experiment about experimenting for example, meta-models are confined to language sciences.

2.7 The term 'object' as a sequence of symbols is used on the nominator side, the term 'property' is used on the predicator side. 'This object has the property q' may be denoted by 'ι o ε χ θ' (ι is a demonstrator, ο is a symbol for objects and χ for properties). N.B.: 'Object' is not a universal predicator, which does not exist.

2.8

Peter ε short

"Peter" ε short

are elementary sentences with entirely different meanings. Once a man named Peter is of small stature. In the other case it is asserted that the name "Peter" is short. The sentences '"short" ε short' or '"four•syl•lab•ic" ε foursyllabic' are called autologic (self-describing), a linguistic phenomenon par excellence, whereas 'short ε short' is nonsense, i.e. '"short ε short" ε nonsense' is a true proposition.

2.9 It is remarkable: On the third level (meta-meta-level) the object level may disappear.

Peter ε short

"short" ε FiveLetterWord

"FiveLetterWord" ε FourteenLetterWord

2.10 If instead of concrete objects abstract objects are used on the first language level, then there is no difference to mention them as a schema on the second language level. In “zipcode“ ε set ’set’ is a meta-predicator.

The UML term ’meta-class’ or ’meta-set’ is misleading. There are no such things like meta-sets. If they would exist mathematicians and logicians would have found them in the last hundred years.

In general the abstraction process is entirely performed on the object level by using an abstraction operation, e.g. { ...} for finite sets.

$$\{\, i \mid x_1^{(i)},\ x_2^{(i)},\ x_3^{(i)},\ x_4^{(i)},\ x_5^{(i)} \,\}\ \varepsilon \text{ decimal-classificatory}$$

is an elementary sentence on the first language level. Whether a name space is a schema or a set depends on the language level.

2.11 Information models in the sense of Phil Bernstein (and CORBA) are bill of materials, i.e. the part-whole-relation of mereological logic is applied. For example: A εModuleSignature, B ε InterfaceSignature, C ε OperationSignature.

$$\ulcorner B, A\ \varepsilon\ \text{PartWhole } 1 \urcorner$$
$$\ulcorner C, B\ \varepsilon\ \text{PartWhole } 2 \urcorner$$

Schemas and Validity

3. The evolution of schemas, i.e. their changes in time, may be reduced effectively to the question of the schema’s validity. ’Quid iuris’ or what schema holds at what time? Valid means: Defensible against everybody.

Thus: Schema evolution does not tackle the problem of ontology: “On what there is“, but the question of epistemology: “On what is valid“.

3.1 Validity with respect to a schema is put into effect, is changed or lost at a certain time in presense or in future. Validity in the past is a historic fact and as such it is unchangeable. Changing and losing hold ’ex nunc’ (from now on) and not ’ex tunc’ (from the beginning on). A schema, valid at a certain time, is called a schema version, or simply a version. Schema and its instances belong together. Instances with a unknown schema are in general not understandable.

3.2 There exists a typology of changes.

a) Stable context R, versioning predication $\ulcorner N\ \varepsilon\ P \urcorner$:

$$R_{t1} \rightarrow R_{t2}$$

b) Instable context R:

- split: $R_{t1} \rightarrow [R_{t2}^{(1)}, R_{t2}^{(2)}]$
- merge: $[R_{t1}^{(1)}, R_{t1}^{(2)}] \rightarrow R_{t2}$ •
- classification upward (merging classification)

$$[R_{t1}, S_{t1}] \rightarrow [R_{t2}, S_{t2}, T_{t2}]$$

with R and S as “differentia specifica“ (special differences) and T as “genus proximum“ (the next higher context in classification)

- classification downward (splitting classification)

$$T_{t1} \rightarrow [R_{t2}, S_{t2}, T_{t2}]$$

3.3 A context R may be sheltered from changes by parametrization, i.e. R(X), where X is a classificator.

3.4 Changes are reflected on the meta-level (relational or interface repository) and not on the first language level.

E.g. (For convenience the extensional notation is used):

<u>First level:</u>

Order(Order#, OrderQty)

Second level:

Relation (RelName, Valid_from, Valid_to)

"Order"	10.01.99	01.01.00
:	:	:

Attribute (AttName, AttType RelName Valid_from, Valid_to)

"Order#"	Nominator	Order	10.01.99	01.01.00
"OrderQty"	Predicator	Order	10.01.99	01.01.00
:	:	:	:	:

Third level:

Relation(RelName, n-ary)

"Relation"	3
"Attribute"	5
:	:

Attribute (AttName, RelName)

"AttName"	Attribute
"RelName"	Attribute
:	:

N.B.: The term "relation" is autologic, i.e.: '"relation" ε relation' makes sense. Logical autologic is supposed to be distinct from semantical autologic (e.g. "short" ε short).

Instead of semantical autologic the term language-dependent autologic is introduced, because for example autologic terms in English are heterologic in German and vice versa:

'"four•syl•lab•ic" ε autologic', and: '"three•syl•lab•ic" ε heterologic' and the corresponding German '"drei•sil•big" ε autologic'.

Instead of logical autologic the term language-independent autologic is introduced. Observe in the example that 'Predicator' is language-independent autologic on the third level:

Second level

"Order#" ε Nominator
"OrderQty" ε Predicator

Third level

"Nominator" ε Predicator
"Predicator" ε Predicator

Abstraction and Equivalence

4. Frege taught us:

The concept horse is not a concept.

In modern notation:

"| horse |" ε' concept,

with ε' as the negative copula (is not) and | ...| as the abstractor "concept" indicating an intensional abstraction, similar to { } as an operator denoting extensional abstraction (2.10).

Frege admits that he is provocative, because he hurts our feeling for languages.

The city Berlin is a city
(city_Berlin ε city)

or

the vulcano Vesuvius is a vulcano
(Vulcano_Vesuvius εvulcano)

are both of the same structure as the positive version:

The concept horse is a concept

(concept_horse ε concept).

We take 'city_Berlin' and 'vulcano_Vesuvius' as more precise nominators than simply 'Berlin' and 'Vesuvius'. With 'city_Berlin' for example it is clear that the German capital and not the small village 'Berlin' in the upper state New York is referenced.

Thus

Berlin ε city

and

Vesuvius ε vulcano

are true, i.e. valid sentences as well.

Is '"horse" ε concept' likewise valid ?

The answer is 'Yes', if "horse" is taken as a schema name of an abstract object and if concept is looked upon as a meta-predicator (like set).

4.1 Frege would be pleased, if we would present him the sentence:

The concept horse is a nominator

("| horse |" ε nominator)

i.e. "| horse |" is a nominator of an abstract object.

4.2 The confusion with

"| horse |" ε' concept

arises, because the term "concept" is used in two different meanings: On the one hand a meta-predicator is meant, and on the other an operation | ….|called abstraction is applied.

4.3 From an epistemological point of view (asking: What is valid?) it is a tremendous achievement to reduce the process of abstraction to the problem of finding an equivalence relation (Lorenzen). Equivalences are easily exhibited in translating natural languages. Here equivalent means synonoymous. The English word "horse" is equivalent to the German word "Pferd".

horse ε P ~ Pferd ε P,

i.e. the properties assigned to an object named horse in the English language are equivalent (~) to an object named Pferd in German.

$$\text{horse} \sim \text{Pferd} \rightarrow [\text{horse}\ \varepsilon\ P \leftrightarrow \text{Pferd}\ \varepsilon\ P]$$

We may take any language and replace for example the German 'Pferd' by the French "cheval' or by some x in any language. Formally the operator | ….|is defined by:

$$|\ \text{horse}\ |\ \varepsilon\ P =_{\text{Def}} \forall x(x \sim \text{horse} \rightarrow x\ \varepsilon\ P)$$

We are talking not just about horses but about the concept of a horse, i.e. | horses |. And to give this new abstract object a name in order to talk about (gr. meta) it, we use the notation "| horse |"

The quotation marks " …" have a concept | | as its schema.

4.4 Abstraction is named 'information hiding' in the so called Computer Science. Hiding is a physical or psychological term, but not a logical one.

4.5 *represent* has two meanings:

• <u>logically</u> a binary relation is meant:

horse *represents* |horse| or **cipher 8 *represents* number 8**

In general:

concreta *are representing* abstracta.

• <u>semiotically</u> an act of symbolizing or its result is meant:

☺ *represents* a face.

"☺" ε icon,

because it corresponds to the symobilized object in one schematic trait (Peirce).

In the so called Computer Science representation produces virtuality in both cases.

4.6 Frege taught us that not just words may be introduced as nominators. Entire sentences may be used instead.

4.6.1 We think of two different performances of Richard III by William Shakespeare.

In performance A an actor is declaiming:

Richard is a murderer

In performance B an actor is whispering:

Richard is a murder

Both interpretations are utterances. “Utterance“ is a meta-predicator.

“Richard is a murderer“ ε utterance

“Richard is a murderer“ ε utterance

We call them utterance A and utterance B. Both utterances are different depending upon the actor, the performance and the direction. But from the point of view of equal word sequences, we may abstract from all these contexts and define:

utterance A ~ utterance B.

It is obvious: We just changed our objects. Instead of horses, utterances are the subject of our talk. Our purpose is to demonstrate two abstraction steps: From utterances to propositions and from propositions to facts. Since two equivalent predicators are representing the same concept, we may state now likewise: Two word equivalent utterances are representing the same proposition.

4.6.2 Now we appear in the role of judges at a court or in the role of scientists. Both are not interested in verbal demonstrations but rather in facts.

Witness X testifies:

Richard is a murderer

Witness Y testifies:

Richard is murdering.

These are two different propositions X and Y. If they are intensionally equivalent they are representing the same fact, a judge has to be interested in. Propositions and utterances are irrelevant for judges and often for scientists.

4.6.3 Information must be classified in three abstraction layers: utterances, propositions, facts.

4.6.4 Knowledge enables to single out opinions from informations (Mittelstraß).

Knowledge and Validity

5. How knowledge is specified remains a question of epistemology (on what is valid) and not of ontology (on what there is).

5.1 If the sense or nonsense of a proposition like

The concept horse is not a concept

is argued on a first language level, its validity discussion is subject to a second language level (meta-level).

Question:

“The concept horse is not a concept“ ε valid ?

Answer:

The proposition is true, if the term ’concept’ has two meanings, i.e. the validity of the proposition is defensible, if we can go back to the validity of the antecedence:

There are two meanings of the term ’concept’.

Question:

How can the validity be defended against the attacks of some opponent ?

Answer:

By going back to the application of the word “concept“ in everyday life. Two situations are distinguishable for the defender:

- Introducing a concept:

  “horse“ is a concept.

- Mentioning a concept in order to talk about it:

  The concept horse is important in the schedules of a cavalry.

If the opponent agrees, the proposition

The concept horse is not a concept

is valid by referring to knowledge of everyday.

If the opponent rejects, then there are two possibilities: Either he is offering another proposal, which we may oppose likewise or we may attack his rejection with regard to our everyday life argument.

5.2 Knowledge is the capability to verify validity.

5.3 The most important means of knowledge acquisition is a dialog between a proponent and an opponent. Their roles may be reversed.

5.4 A dialog with oneself is called thinking.

5.5 Thinking is a means of knowledge acquisition.

დავიწყებული ციტატები

ჰარტმუტ ვედეკინდი

გერმანია, ერლანგენ-ნიურნბერგის უნივერსიტეტი

რეზიუმე

შემოთავაზებულია ავტორის ექსპერიმენტის შედეგები (კატეგორიალური ანალიზის, რელაცირი მოდელებისა და ლოგიკის თეორიაზე დაყრდნობით – რედ.) იმის შესახებ, რომ გაუგებარი ელემენტარული ფილოსოფიური ტერმინოლოგია ყველაზე უკეთ შემოთავაზებულია ვითჯენშტეინის აფორიზმულ სტილში. ვითჯენშტეინის მიხედვით ნაჩვენებია, თუ რა ადვილია მიზნის მიღწევა, როცა ეს ტერმინოლოგიური პრობლემები გადაწყვეტილია. სიტყვა „დავიწყებული“ აფიქსირებს, რომ არაფერი არაა ახალი ამ ნაშრომში. თითქმის ყველაფერი შეიძლება მოიძებნოს ენციკლოპედიებში. ავტორი მადლიერია წიგნის „ენციკლოპედია, ფილოსოფია და მეცნიერული თეორია“ რედაქტორის (ჯ. მიტელშტრასის).

ЗАБЫТЫЕ ЦИТАТЫ

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Резюме

Автор сделал опыт, что запутанная, основная философская терминология лучше всего представлена, принимая афористичный стиль Виттдженштеина. И в смысле Виттдженштеина показывается, как просто достигнуть цель, когда эти терминологические проблемы решены. Слово "забытый" регистрирует, что ничто не является новым в этой работе. Почти все может быть найдено в энциклопедиях. Автор признателен к редактору книги “Энциклопедия, философия и научная теория” (Дж. Мительштрасу).