The Epistemological Aspects of Investigative Hypotheses

David Petretei

Police Major, Expert of Latent Prints, Assistant Professor at, National University of Public Service, Faculty of Law Enforcement, Department of Investigation Theory, Budapest, Hungary, EU. NKE RTK, 1089 Bp., Dioszegi S. u. 40., Hungary

Abstract

This paper is about the philosophical and epistemological aspects of investigative hypotheses.

Criminal investigation is a kind of cognition, so it is important to know the basic philosophic concept of knowledge and truth. Different schools and traditions of philosophy have given different answers to these.

One of the basic elements of investigative thinking is, in addition to being reconstructive and retrospective, thinking in hypotheses. Logical, semantic, syntactic, epistemological, and ontological principles must be taken into account when formulating hypotheses. Choosing between the hypotheses should be based on preference and indifference criteria. These criteria of preference and indifference will also be logical and epistemological.

Testing, validating, and rejecting hypotheses is an essential element of investigative work. The plausibility, credibility, and accuracy of competing hypotheses are constantly changing depending on the investigative data obtained. It is a basic principle that all hypotheses should be tested and, if possible, the testing should be performed in parallel.

Keywords*: investigation, hypothesis, truth, cognition*

Introduction

The investigation is a kind of cognition, it is a cognitive activity.[1] One of the most important components of cognition is knowledge. The definition of knowledge is from the great Greek philosophist, Plato: knowledge is a justified true belief.[2] To avoid confusing this belief with religious belief or any other believing thing, we can say conviction instead. The condition of justification protects against accidentally hit the correct answer as knowledge.

The definition of a justified true belief has stood sound for almost two thousand four hundred years, till in the 20th century the so-called Gettier problems challenged it.[3] Edmund Gettier's examples are paradoxes where a person's beliefs meet the truth but not because of the right evidence. Thus, he introduces the fourth criterion next to the Platonic triple: justified true belief is formed on adequate evidence.

The Concept of Truth

Cognition only fulfills its role if the acquired knowledge is true.

What is „true"? Almost every philosophic school has its answer for this. After 1945 the Soviet philosophy, the so-called dialectic materialism strongly affected the Hungarian academic world. The dialectic approach is based on the philosophist Hegel, the materialism is mostly based on Feuerbach, both of them were German philosophists. Dialectic materialism was developed in the middle of the 19th century by Marx and Engels and further developed

in the early 20th century by Lenin. The dialectic materialism claims the primacy of the material world over the world of ideas and thoughts, and also claims the constant changes of every existing thing.[4] The core concept of Lenin's epistemology is the reflection of reality on the cognitive mind.[5]

The theory of the adequacy of truth can be found from Aristotle through St. Thomas Aquinas to dialectical materialism. Truth is a correct reflection of reality on one's cognitive mind. The cognitive subject reproduces the object of cognition, as it exists outside and independently of cognition.[6] The touchstone of truth is practice, so insofar as the dialectical materialist theory of truth can be understood not only as a theory of adequacy but also as a pragmatic theory of truth.[7]

The most important feature of truth is its objectivity in terms of content. It does not depend on the cognitive subject whether the views he considers true are true; but whether these views correspond in substance to objective reality. However, the truth is not the same category as reality, these are two different concepts. Reality is objective, cannot be characterized by true or false qualities. Only a cognitive reflection of reality can have such qualities (true or false); because the reflections as products of cognition may differ from reality. The truth as a product of cognition is subjective, but in terms of its content, it is objective, because the measure of the differentiation of true and false is corresponding with objective reality. And the test of the correspondence is the practice.

Thus, truth is always objective in its content, so we do not use the term "objective truth" established in the (especially old) forensic literature, since truth other than objective in terms of content and subjective in terms of form does not exist. We also disregard the use of absolute and relative adjectives. The absolute and relative nature of truth forms a dialectical unity. In truth we always find the absolute moment, that is, the part of wholeness: it is nothing but a faithful reflection of reality. At the same time, the reality is inexhaustible, no truth can fully reflect it; in that sense, therefore, all truth is relative.

The Investigative Thinking Way

An important component of investigative thinking, among several others, is its retrospective and reconstructive nature. Things discovered during an investigation should always be considered as results. The investigator considers everything he or she faces as a result and tries to deduce the possible causes. Only a probabilistic conclusion can be drawn as to the reason for the result. Therefore, several explanatory hypotheses should always be set up as possible explanations.

During the investigation, we use a kind of scientific cognition method. The common steps of the scientific method are

1. data collection and analysis,

2. formulation of the question,

3. setting up the hypothesis (i.e., the possible answer to the question),

4. selection of the testing method,

5. testing, and

5. conclusion.

The conclusion may be to reject or justify the hypothesis.[8]

Hypotheses are indirect knowledge in the sense that they can be proved with the help of other knowledge accepted as true at a given level of current knowledge. In the case of hypotheses, a distinction between truth and proof is justified. Hypotheses are also true or false as statements, but due to their indirectness, their verity can only be established through the transmission of other knowledge. Consequently, the truth of hypotheses can only be determined indirectly by their degree of proof, the plausibility. Hypotheses are in a verity relationship with the facts of reality (epistemological connection) and they are in a corroborative relationship with other

knowledge (logical connection).[9]

In investigative thinking or forensic cognition, hypotheses are the more or less probable possibilities and assumptions. The exclusion or confirmation of each hypothesis is the practical goal of the investigation.

Formulating the Hypotheses

There are several ways to form a hypothesis from the available data.

The deduction, if we break down the existing data further, that is, we infer from the general what is special.

It is inductive to generalize the existing data, that is, to infer the general from the particular. There is no possibility of complete induction because there is always only a limited, finite number of specific data.

Abduction is when the investigator recognizes a pattern in existing data and finds an assumption that adequately explains all existing data.

In the initial phase of an investigation, almost always the abduction is used to set up the very first raw hypotheses. A corpse lying in the room, with a headshot and a handgun in his hand, provides a possibility to hypothesize an accident, a suicide, and (a deceptive set scene of) a homicide.

The formulating of proper hypotheses has logical, epistemological, and ontological requirements. Logical requirements can be divided into syntactic and semantic requirements.[9]

It is a syntactic requirement that the version shall be well-formulated: a statement, which is an allegation about the reality. A statement or allegation is a predicate in logic. Single statement if the allegation is to declare something about a single specific individual (e. g. "this hunting knife is the tool of perpetration"). An existential statement which says something about at least one individual (e. g. "the tool of perpetration is a hunting knife"); and a general statement which declares something about every individual in the universe (e. g. "hunting knives are capable of killing humans"). In the practical investigative work, the hypothesis often takes the form of a (poetic) question, but it is important to analyze the content: in fact, "couldn't she get there later?" is a hypothesis because the statement claims that she later got there; the "what if it wasn't so?" however it is not a hypothesis (by itself) because it does not contain a predicate, a logical statement.

It is also a syntactic rule that the hypothesis shall be internally consistent. It means the hypothesis shall not have a logical contradiction in it, that is, that a statement and its opposite do not occur in it. A hypothesis on the phenomena of a contradictory nature can be formulated, but there can be no logical contradiction within a hypothesis. For example, a subject of a complex crime of mutual bodily harms and public violence may be both a perpetrator and a victim, but not in the same aspect.

The third syntactic rule is the logical derivation of every conclusion.

The first semantic requirement is conceptual sharpness. The terms used in the hypothesis shall be as sharp as possible. The opposite of sharpness here is the ambiguity of the term, which can be extensive or substantive. The ambiguity of terms can be reduced by specifying their content, their criterion (realistic definition). Specifying their connections with other terms (nominal definition), the designation of their referents and subjects (interpretation), the using of analogy, and so on. A sharp term can be the „minor injury", a vaguer term could be „thoroughly beaten". A realistic definition can be any legal state of affairs (e. g. counterfeiting, bribery), a nominal definition can typically be statutory delimitation (e. g. murder or manslaughter), and so on.

An additional semantic requirement is semantic homogeneity. The terms used in the hypothesis should refer to qualitatively homogeneous, and well-defined areas of reality. Usually, this is the case in

the criminal justice system, where the past is cognized to answer questions of criminal relevance, and this homogeneous area is not mixed with the elements of other conceptual circles, such as beauty, love, providence, etc.

The last semantic requirement is that the terms that occur in the lowest level hypotheses should be interpretable empirically, but during an investigation, this is usually proper. The point is that the terms that can be linked to reality, shall not be empty abstractions. Due to the nature of the thing, forensic science uses only concepts that can be interpreted empirically.

The first of the epistemological criteria is the requirement of external consistency, i.e. the hypothesis must be consistent with at least some of the already proven statements. It cannot be entirely consistent, because then it would offer nothing new, it would only redraft the existing knowledge. But it cannot be completely contrary to the knowledge that has already been proven, because then should either be discarded without any further investigation or should be reviewed the existing knowledge. In a practical investigation, if death has been considered to be caused by crime, the hypothesis of suicide should be excluded. If, however, there is a strong suspicion of suicide, some of the already proven statements of the crime shall be reviewed. Among the syntactic requirements, the requirement of internal consistency was described, and among the theories of truth, the theory of coherence: the statement is true if fits coherently the other true statements.

The second epistemological criterion is the requirement for possible empirical revision of the hypothesis. Conclusions should be possible to derive from the hypothesis, even with the usage of other hypotheses, and the conclusions should be able to be compared with the empirical evidence, with the facts of the perceptible reality. This comparison is mainly made through so-called indicator relations. An indicator relation between version and empirical reality is, for example, cause and effect relation, part and whole relation, structure and function relation, and so on. This epistemological requirement excludes any hypothesis which can not be, theoretically and practically, proved or disproved (e.g., what the victim thought before his or her death). Respectively, this criterion allows the deduction: with knowing one side of the indicator relation, e.g. knowing the cause or part, the other half of the relation can be deduced, e.g. the cause, or the whole.

The ontological criterion requires the hypothesis to be formulated with only existing elements. Every object, act, or happening shall be a part of the known reality. Usually, during an investigation, this requirement is fit.

Choosing Among Hypotheses

Usually, during an investigation, there are several hypotheses, some mutually exclusive and some mutually supportive. There are some preference and indifference criteria, which can help to choose among hypotheses. These criteria can also be logical, epistemological, and ontological.[9]

Based on the logical criterion, when choosing between complex hypotheses, the one that builds on independent simple hypotheses should be preferred over the one that builds on non-independent simple hypotheses (i.e., which are derived from each other). Thus it becomes available that the pieces of evidence should not form a chain but a net: the loss of a minor piece of evidence does not necessarily destroy the whole proof.

The first epistemological criterion is greater explanatory power. Its components are scope, accuracy, and depth. The scope is the number of phenomena explained by the hypothesis. Usually, the more the hypothesis explains, the less accurate it is, and vice versa. The depth of the explanation means that it is as structural as possible, revealing internal contradictions as much as possible. During an investigation, at first glance, usually, the above relationship between scope and accuracy is not

obvious, because the scope of investigative hypotheses is usually limited: it refers to a past event. However, if the investigator looks at the issue in a broader context and is curious about the general causes of the crime, he or she inevitably comes to hypotheses of the kind that "who" does "such" crime. In these cases, the investigator will experience the above relationship between scope, and accuracy. For example, "usually only those living in deep poverty steal" is a large-scope but a less accurate hypothesis, as opposed to "an offender who saws a ground wire from a working transformer and does not suffer an accident may be an experienced person with knowledge of electrical installation."

Sophistication is also an epistemological criterion. A hypothesis is more sophisticated, the problem solving is more effective. Other epistemological criteria, like originality, heuristic force, unifying force, predictive force are less relevant when comparing investigative hypotheses.

The more flexible hypotheses should be preferred, which can adapt to new pieces of information. The flexible hypothesis can evolve further with new information. Of course, flexibility does not mean that the hypothesis is compatible with information to the contrary.

Occam's razor is also an epistemological criterion of preferences. In Latin, "entia non sunt multiplicanda sine necessitate". If one of the two hypotheses contains all of the theoretical concepts of the other hypothesis and also other theoretical concepts, then the choice of the other hypothesis is more expedient. Choose the simpler of the possible explanations offered is advisable.[10] Of course, measuring, judging, and proving which of the two hypotheses is "simpler" is not always straightforward.[11] Suicide should not be preferred over homicide just because it is a „simpler" hypothesis because it is not. But assuming a second perpetrator just because it is not possible to exclude is highly contraindicated in every case where there is no positive information about a second perpetrator. The theorem can also be formulated as assumptions should not be unnecessarily multiplied, the above Latin formula essentially means the same.

The last epistemological criterion that facilitates the choice between rival hypotheses is the possibility of a simpler empirical review. This is easy to see: During the investigation, it is advisable to start the work with the simplest versions that can be checked, so that the work can be more focused and concentrated later.

Finally, the ontological criterion: the level-appropriate hypothesis is preferred to the lower-level (reductive) and higher-level (teleological) hypotheses. During an investigation, this usually fits. A teleological hypothesis, for example, could be the one that does explain the „why" question with overall sociological and political theories, instead of the motive of the particular criminal case, which is being investigated. A reductive hypothesis, for example, could be the one that does explain the „what happened" question with very simple biological theories of death, instead of explaining the whole incident of the murderer.

The Hypotheses and the Investigation

Once the investigator has hypotheses, the testing should be started. The „testing" means the investigation itself: data acquisition, crime scene process, crime reconstruction, experiments, interrogations, and confrontations, etc.

It is a basic principle that all plausible hypotheses should be tested and, if possible, the testing should be performed in parallel. Parallel testing is important for time management. If one hypothesis is found to be less plausible after several weeks of investigation, the investigation of the other possible hypothesis could only begin with a delay of several weeks. If the investigation of the two hypotheses takes place more or less in parallel, such a delay should not be expected. Of course, the capacity of the investigator is limited, so it is not possible to do parallel work covering all possible hypotheses. In this case, the preference and

indifference criteria outlined above may help.

Conclusion

Hypotheses are formed from the data available at the beginning of the investigation, which provide different explanations for the causes and circumstances of the event under investigation.

The investigation can be successful if the basic philosophical principles outlined in the article are followed in formulating the hypotheses.

Ethical Clearance – non-applicable

Sources of Funding – self

Conflict of Interest – none

References

1. Angyal M. (ed.): Cognitive Criminalistics. Cognition – Theory – History. Dialog Campus, Budapest, 2019. (In Hungarian. Angyal Miklós (szerk.): Kognitív kriminalisztika. Ismeret – elmélet – történet.)
2. Ichikawa J. J., Steup M. The Analysis of Knowledge. In Zalta E. N. (ed.): The Stanford Encyclopedia of Philosophy (Spring 2017 Edition), URL: https://plato.stanford.edu/archives/spr2017/entries/knowledge-analysis/ (2021. 04. 10.)
3. Gettier E. Is Justified True Belief Knowledge? Analysis, 6. 1963. 121-123 pp.
4. Muller A. Cognition in the Physichs and the Dialecical Materialist Concept of the Nature. Kossuth (Press), Budapest, 1974 (In Hungarian: Müller Antal: Fizikai megismerés és dialektikus materialista természetfelfogás)
5. Lenin V. I. Materialism and Empiriocriticism. [1908] Kossuth (Press), Budapest 1964. (In Hungarian: Vlagyimir Ilijics Lenin: Materializmus és empiriokriticizmus [1908])
6. Foldesi T. (ed.): The Dialectic Materialism. Tankonyvkiado (Press), Budapest, 1976. (In Hungarian: Földesi Tamás (szerk.): Dialektikus Materializmus. Tankönyvkiadó, Budapest.)
7. Harsing L. An Introduction to the Philosophy of Sciences. Bibor Kiado (Press), Miskolc. 1999. (In Hungarian: Hársing László: Bevezetés a tudományelméletbe. Bíbor Kiadó)
8. Girod R. J. Logical Investigative Methods. CRC Press, Boca Raton FL USA. 2015.
9. Harsing L. The logic of the scientific cognition and plausible conclusions. Akademiai Kiado (Press), Budapest. 1971. (In Hungarian: Hársing László: A tudományos megismerés és a plauzibilis következtetések logikája. Akadémiai Kiadó)
10. Jefferys W. H., Berger J. O. Sharpening Ockham's Razor on a Bayesian Strop; Purdue University 1991. URL: http://quasar.as.utexas.edu/papers/ockham.pdf (2021. 04. 10.)
11. Sober E. What is the Problem of Simplicity? In Keuzenkamp H., McAleer M., Zellner, A. Simplicity, Inference, and Econometric Modelling. Cambridge University Press. 2002. 13-32 pp.