

METHODOLOGICAL CONCEPT OF HYPOTHESIS BUILDING AND VERIFICATION IN BEHAVIOURAL RESEARCH

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DOI: 10.35189/iphm.icpek.2019.33

Abstract. *The purpose of this paper is to strengthen and develop the means of assessing and testing behavioural relationships in order to optimise specific fields of action in human and social sciences. Our objective is to provide a research perspective and methodological guidance for verifying hypotheses in the sphere of behavioural analysis, which studies the influence of the concrete environment on behaviour, as well as the impact of behavioural actions on the environment. How do we analyse behaviour? How can we assess and test it? Current methodology in behavioural study suggests a holistic, global approach, the empirical significance in testing scientific theories having been established at the level of the entire system of statements. The design of our methodological process, which associates, specifies variables and relationships between hypothesis variables, helps to improve the means of building and testing the hypotheses addressed in behavioural research. In the light of the Structural model for validating the research hypotheses, the Synthesised model for the research hypotheses and the causal relationship between variables, and the General formalisation of the conceptual model for verifying the main hypotheses, our approach can meet the needs of developing specific research methods in the sphere of behavioural relationships. Behaviour is examined from the perspective of its complexity to the paradigm stage. For a conclusive scientific research, our study will ultimately be followed by a multistage operational approach based on a separate comparison of the specific behavioural modalities of the subjects and a congruent means of statistical validation.*

Keywords: *research methodology, behavioural relationship, assessment, testing.*

Introduction

The study of behaviour in interdisciplinary research can be developed for the benefit of many scientific disciplines. When we aim to understand the game process in cognitive learning, tactical behaviour in the context of adversity, coordination of managerial actions, dynamisation of working teams, bodily behaviour in kinetotherapeutic situations, provision of crowd movements, etc., their specific research can exploit the contribution of other disciplinary studies in the field of human sciences.

In order to observe and analyse the development of a relationship, we should remind that it is a way of acting and reacting in certain circumstances or situations following a connection/connections, a relation between things, facts, ideas, processes, or between their own qualities.

In this context, we recall Piaget's work (1976), which highlights behaviour as the available means for an individual to adapt to their environment, and Fraisse (1968), who emphasises that man only lives in a permanent relationship with an environment.

Problem statement and research questions

Current methodology in behavioural study suggests a holistic, global approach, the empirical significance in testing scientific theories having been established at the level of the entire system of statements.

How do we analyse behaviour? How can we assess and test it? What is the hypothesis testing procedure in behavioural research?

The design of our methodological process associates and specifies, in an operational way, the variables and the relationships between the hypothesis variables addressed in behavioural research.

Purpose of the study

The fundamental purpose of this paper is to strengthen and develop the means of assessing and testing behavioural relationships in order to optimise specific fields of action in the field of human and social sciences.

Our objective is to provide a research perspective and methodological guidance for verifying hypotheses in the sphere of behavioural analysis, which studies the influence of the concrete environment on behaviour, as well as the impact of behavioural actions on the environment.

Material and Methods

Before going into the core of this paper, we mention that our approach is interdisciplinary and multidisciplinary, which contributes to the choice and validation of the specific means of building and verifying the hypothesis of a research. The comparative study, which is pertaining to social sciences, plays a special role. This discipline allows us to better understand the role of models in the comparative approach. The exploratory study is also an important element in behavioural sciences research, presenting economic explanatory theories (marketing). The analysis through descriptive statistics, like the observational study, belongs to the field of psychology. The process of differentiating and associating comparable behaviours, as well as the control of the variables involved in a comparative study, belong to the economic sciences, the field of law, but also the political field. From the sociological field, we can approach ideas using comparative analysis by highlighting the regularities found between different societies.

In essence, our conceptual model based on the construction and verification of human behavioural hypotheses, follows the recommendations of DeLone and McLean (1992), who state that the researcher has a broad list of dependent variables of which they can choose, adding that “no single variable is intrinsically better than another, so the choice of success variables is often a function of the objectives of the study, the organizational context” (p. 80), as well as the systemic aspect addressed by the study, the independent/dependent variables involved, the research methods, the level of analysis.

Epuran’s projections (2005) also provided a theoretical and methodological basis for establishing our model. The author claims that, given the heuristic nature of the hypothesis, the discovery and formation of concepts, the conduct of experiments, observations and the verification of their significance, must ensure theoretical certainty (Epuran, 2005, p. 101). The model of the hierarchical organization of hypotheses within a theory (designed by Bogdan and Micloveanu, 1974, p. 191) is schematically represented as follows (Figure 1):

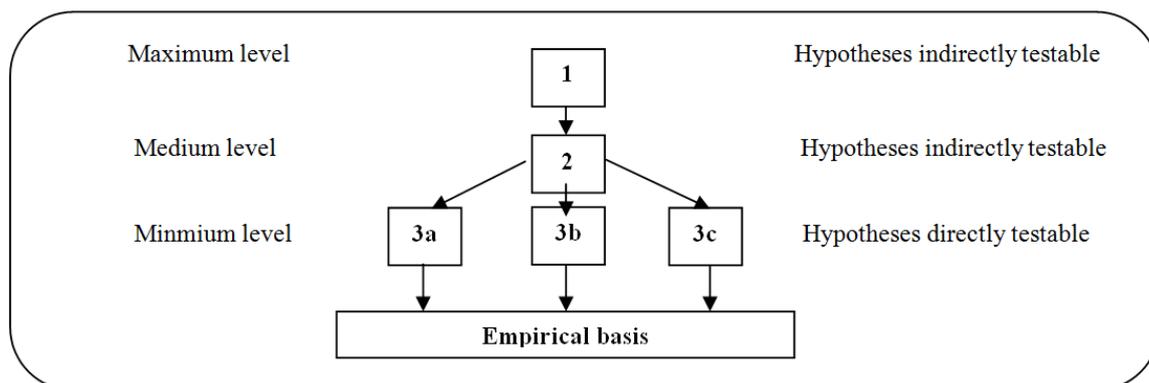


Figure 1. Model of the hierarchical organization of hypotheses within a theory
(Bogdan & Micloveanu, 1974, p. 191)

Epuran (2005) emphasises that the researcher’s problem consists in establishing the most suitable variables for verifying the hypothesis and solving the specific problems, because in reality there are a lot of possibilities to choose and relate the independent and dependent variables. For the control of variables, it is possible to apply a technical approach concerning the development of experimental plans with many variables in order to detach, through analysis, their relative weight on the results.

Conceptualisation and implementation

Given the views of the above authors, our model integrates concepts and variables relative to the behavioural testing specificities. Each concept of the behavioural model gives room for characteristic variables that have their place in the network of direct or indirect links.

The problem previously defined in a research leads to the identification and definition of the independent (explanatory) and dependent (explained), latent (indirect) and directly observable (testable) variables.

The explanatory variable represents a factor or concept presumed to cause another phenomenon or concept. This variable implies explaining the variation (development) of the studied phenomenon. The explained variable can also represent a phenomenon or concept, but we seek to know its determinants. The latent variable is a directly unobservable concept, which requires the assembly of a set of indicators to be measured. (Roussel, Durrieu, Campoy, & ElAkremi, 2002, p. 9)

Latent variables can explain the variation of a set of directly observable variables.

Therefore, the problem of a research can lead to the formulation of the main hypotheses and the identification and definition of the variables (invoked, auxiliary-type ones) on three levels in order to study their relationship with the specific relational behaviour analysed. These key hypotheses (HP) are decomposed into subordinate hypotheses (HS), which are themselves analysed through adjacent subordinate hypotheses (HSA). By proposing these variables, the objective is to verify the existence of relationships between these variables belonging in their turn to the three types of assumptions (Figure 2).

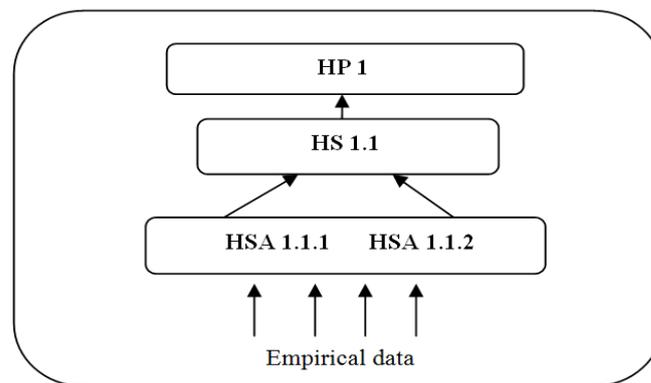


Figure 2. Model structure for validating the hypothesis of a research (Prisăcaru, 2010, p. 164)

The relationships between the variables of these hypotheses allow for the findings of the general problems in scientific and human research. Thus, the test concept represented by the structure of the hypothesis verification model specifies three categories of hypotheses (Figure 3):

- Main hypothesis (HP): indirectly testable (maximum level), is based on the set of elements of the conceptual model of verification of the research hypotheses. It states the supposed relationships between dependent variables (for example, the development and optimisation of the Standardised Specific Behaviours [SSB] of subjects “X” and “Y”) and independent variables (ways to design the SSB to make them more effective). The main hypothesis is decomposed into subordinate hypotheses (HS 1.1, HS 1.2, ...).

- Subordinate hypotheses (HS): indirectly testable (intermediate level), are partial hypotheses of the conceptual model of verification of the main hypothesis. These HS hypotheses (HS 1.1, HS 1.2, HS 1.3, etc.) outline the indirect relationships between variables at different levels of the conceptual model according to the given context (for example, the SSB preference in a specific context). Subordinate hypotheses subdivided into adjacent subordinate assumptions that can be found at several levels (HSA 1.1, HSA 1.2, etc.) will also be studied.

- Adjacent subordinate hypotheses (HSA): directly testable (minimum level), allow the analysis of relationships that exist between subordinate hypotheses. They report the existence or non-existence of a direct relationship, linking the categories of a variable to the categories of another variable; they are marked as HSA 1.1.1, HSA 1.2.2, etc.

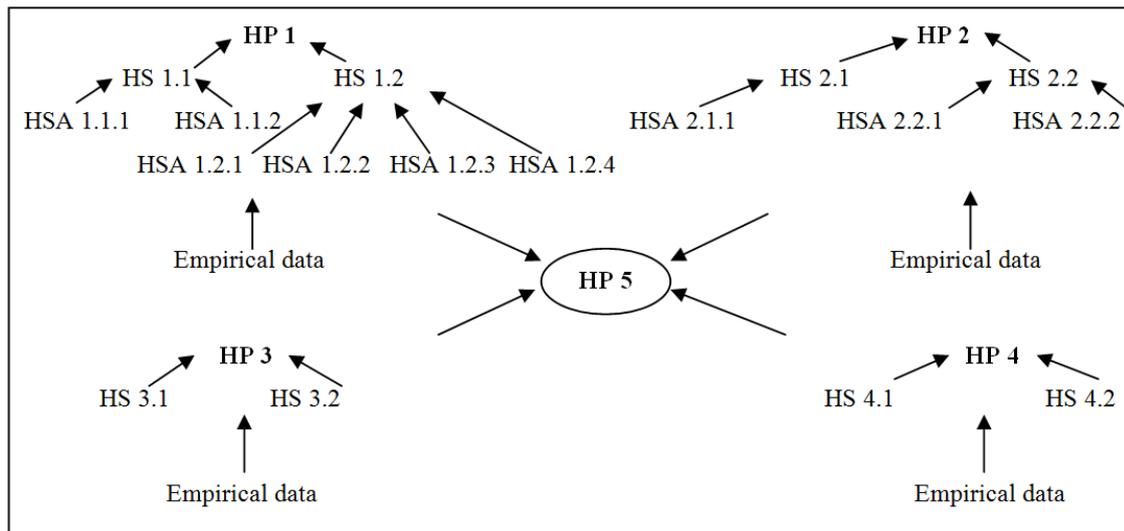


Figure 3. General layout of the conceptual model for verifying the main hypotheses (Prisăcaru, 2010, p. 169)

To exemplify our concept of building and verifying the hypothesis of a research, we were interested in the relationship between the standardised creative behaviour and the optimisation of subjects' performance in conditions of sports adversity and comparatively between different groups of subjects.

The behavioural relationship is analysed on the basis of dissociation, depending on the context, to be classified into different types of behaviours (Collective Acting Techniques [CAT]), the performance/optimisation of behaviour being mirrored by the frequency and the result of their degree of efficiency. For example, "good behaviour" / "acting well" was translated into the concept of efficiency, and a standardised behavioural relationship was interpreted by the notion of frequency.

The observation method allowed us to perceive the studied phenomenon in an intentional and methodical (active) manner, the main field of the observations being the collective tactical behaviour, selective in relation to the objective pursued. Active and direct observation was needed due to the deliberate search for facts in the context of natural, everyday conditions, without our intervention. Therefore, we focused our attention on specific sectors of action in which behavioural actions were valued in order to highlight the tactical behavioural characteristics corresponding to the groups of subjects studied in the sports game (elite European and top Romanian handball teams).

Results and Discussion

The synthesised model of building research hypotheses and causality between variables (Prisăcaru, 2010, p. 165) provides an example of structuring hypotheses and outlining causal relationships that may exist in the variables of the developed (designed) hypotheses:

- Main hypothesis (HP 1): creative rationalisation and standardisation of CAT are priority elements in the development and optimisation of tactical behaviour in elite European (EUR.) groups compared to top Romanian (RO.) groups.

Variables: explanatory latent – independent variable (specific modalities for developing CAT); latent explained – dependent variable (development and optimisation of CAT in elite EUR. and top RO. groups).

- Subordinate hypothesis (HS 1.1): creative rationalisation and standardisation of CAT are priority elements in the development and optimisation of tactical behaviour in elite European teams.

Variables: explanatory latent (rationalisation and creative standardisation of CAT); latent explained (developing and optimising tactical behaviour in elite EUR. teams).

- Adjacent subordinate hypothesis (HSA 1.1.1): Elite European groups preferentially use CAT against tiered defence.

Variables: directly observable explanatory – directly observable independent (CAT preference for tiered defence); explained directly observable – directly observable dependence (development of tactical behaviour conduct in elite EUR. groups).

- Adjacent subordinate hypothesis (HSA 1.1.2): Elite European groups preferentially use CAT against aligned defence.

Variables: explanatory directly observable (CAT preference against aligned defence); explained directly observable (the conduct of tactical behaviour in elite EUR. groups).

- Subordinate hypothesis (HS 1.2): CAT developed differently in top Romanian groups.

Variables: explanatory latent (CAT developed preferentially in a different manner from elite EUR. groups); latent explained (the conduct of tactical behaviour in top RO. groups).

- Subordinate adjacent hypothesis (ASH 1.2.1): top Romanian groups preferentially use CAT against tiered defence.

Variables: explanatory directly observable (CAT preference against tiered defence); explained directly observable (conducting tactical behaviour in top RO. teams).

- Adjacent subordinate hypothesis (HSA 1.2.2): top Romanian groups preferentially use CAT against aligned defence.

Variables: explanatory directly observable (CAT preference against aligned defence); explained directly observable (developing tactical behaviour in top RO. teams).

- Adjacent subordinate hypothesis (HSA 1.2.3): CAT against tiered defence is differently prepared in elite European and top Romanian groups.

Variables: explanatory directly observable (CAT against tiered defence is prepared in a preferentially different manner); explained directly observable (the conduct of tactical behaviour in elite EUR. and top RO. groups).

- Adjacent subordinate hypothesis (HSA 1.2.4): CAT against aligned defence is differently prepared in elite European and top Romanian groups.

Variables: explanatory directly observable (CAT against aligned defence is prepared in a preferentially different manner); explained directly observable (the conduct of tactical behaviour in elite EUR. and top RO. groups).

In order for our main hypothesis to be testable, given its generality and specific context, we modified the initial assumptions to make them more accurate and more rateable. The types of retained hypotheses rigorously define the variables and the nature of the relationships between them. Each subordinate or adjacent subordinate hypothesis is complemented by its verification through the confrontation with empirical data. The validation of the hypotheses is based on data collected from the shorthand behavioural actions of the studied groups of subjects.

The repetition of tactical actions and consistent data led to the statistical calculation approach in order to remove current observation errors. The data analysed through this statistics provide a synthetic picture and a preparatory step in substantiating the inferential statistical procedures intended to verify the hypothesis (Popa, 2008, p. 45). This approach offered the possibility to use a pragmatic statistical-mathematical method. It represented a higher abstraction level, and its use in mathematical concepts served to explain the nature of probabilistic determinism by statistically processing the data.

To demonstrate statistically that there is a preference for a certain CAT category in the behaviour of the studied groups of subjects, we have applied the chi-square test for association (independence), a true correlation test for data. In essence, through this variant of the chi-square test, we were able to compare the observed frequencies of a distribution (variables) with the frequencies corresponding to another distribution (variables), both measured on a category scale, to see if there was an association between variables. By testing the difference between the values of the category variables, we tried to find an association or dissociation between variables, concluding that the applied test provided a precise and relevant measure. The statistical procedures allowed us to highlight the tactical behaviour characteristic of the studied groups of subjects, and thus to give a statistical validation value to the tactical modalities of each group of subjects.

The general analysis of the results showed certain constants of the specific behavioural actions and was a confirmation of the research hypotheses. After the empirical analysis of our material, we managed to precisely formulate the modalities of the specific behavioural actions of each team analysed and to determine the typology of the relevant model. The comparative analysis carried out on both groups provided descriptive elements that

facilitated the perception of the subjects' functioning tendencies in a defined context. With the observer model, we identified certain regularities that lead us to creatively standardised new behavioural requirements.

Conclusion

To conduct pertinent scientific research, the analysis of the comparative behavioural modalities of different subjects/groups of subjects involves scientific methods used in the economic (marketing), political, legal, psychological and sociological fields. This option was a methodological support of great help to achieve a wider vision of reality (inter-/multidisciplinary approach).

The study of behavioural relationships in human activities and interactions required analyses and research on behaviour through innovative means of assessment and rigorous scientific experiments. These were intended to make legitimate conclusions through demanding formulations.

In the light of the Structural model for validating the research hypotheses, the Synthesised model for the research hypotheses and the causal relationship between variables, and the General formalisation of the conceptual model for verifying the main hypotheses, our paper responds to the needs of developing specific research methods, the behaviour being examined in terms of its complexity raised to the rank of a paradigm.

The use of this approach ultimately requires a multistage operational endeavour that consists in comparing the specific behaviours of the subjects. Comparisons will lead to concrete conclusions, based on the rules of statistical interpretation (Epuran, 2005, p. 251).

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