R E V I E W

Dissertation work to acquire of the educational and scientific degree "Doctor" , on the topic "Possibilities of the "Comparative Scan" method (cSM) in the analysis, visualization and psychological interpretation of experimental data of the "Choice by preference" type", in professional direction 3.2 . Psychology, Doctoral Program "General Psychology",

presented by Ivaylo Georgiev Panov, a full-time doctoral student in the Department of General, Experimental, Developmental and Health Psychology at the Faculty of Philosophy of Sofia university "St. Kliment Ohridski"

Research supervisor: Prof. Dr. Ivan Bardov

Reviewer: Prof. Dr. Emilia Alexieva - SU "St. Kliment Ohridski"

The presented dissertation work is unique in its nature, as it reflects an original concept of its author and is the result of the theoretical analyzes and empirical research carried out by its author over the years.

Ivaylo Panov presents to us his concept of comparative scanning, which he has been developing for more than 20 years and which is presented in numerous of his independent and co-authored publications.

A key concept in this concept is the concept of "comparative scanning" and more specifically "method of comparative scanning", which the author defines as "...innovative technology for processing, analysis, visualization and interpretation of psychological experimental data" (p.6).

There is no doubt that the chosen issue is current, modern and promising.

The reader quickly understands that the research issue is subjectively meaningful and important to its author. Undoubtedly, Ivaylo Panov presents us with an ambitious project that has achieved a complete character, at least as far as the presentation of the author's concept is concerned.

The structure of the text complies, in its main structural elements, with the standard requirements for this type of work and includes an introduction, three chapters, a conclusion, literature and appendices.

The introduction is quite extensive (almost 30 pages), in which the author explains what scientific research is, having chosen to be guided by the methodology and methods of pedagogical research for reasons incomprehensible to me. This refusal to use the psychological methodology will probably explain the lack of essential information in the presentation of the conducted experiments in the empirical part of the dissertation text.

Even here, the doctoral student refers to the fundamental work of Clyde Coombs "Data Theory", popularized in Bulgarian psychology by Prof. Encho Gerganov. Building on this theory, Panov seeks to further develop it in the direction of two types of data (nomothetic and idiographic) in the context of the "choice by preference" paradigm.

The goal of his research program, presented in the dissertation, is to "...validate the comparative scanning method as a theoretical concept and technological tool for the analysis, visualization, and psychological interpretation of preference-choice experimental data produced by alternative forced choices between two objects (stimuli)' (p. 10). According to Panov, "...regardless of the field of application (psychophysics, personality psychology, etc.), comparative scanning offers a universal algorithm for planning and conducting experimental procedures, so that specific software processing is applied to the data, leading to a convincing interpretation of the results based on the theoretical concept of the method" (p.10).

The doctoral student has set himself 5 research tasks, which I will summarize as follows (pp. 11-13):

1) "To position cSM (the comparative scanning method - CSM) in the general framework of the methods of data analysis of psychological research", in the context of the main methods of data collection in psychological research (experiments, quasi-experiments, interviews, meta-analyses and etc.);

2) "Full presentation of the method of comparative scanning in all its aspects (essence, possibilities and limitations)";

3) Updating and supplementing the computational toolkit through which the IAS is implemented.

4) "…Empirical evidence for the adequacy of the IAS – in theoretical and interpretive terms", including validity and reliability of the method. I will note that the performance of this task is extremely important for the presentation of the MCC model, since 12 experiments are presented that illustrate (each one of them) some specific capability of the model.

5) An additional task attempts to logically connect the IAS and another author's model called the "Theoretical Model of Associative Interactions (ATM).

As you can see, the PhD student has set himself very ambitious tasks, which are aimed at creating (according to him) "... a whole new direction in the development of psychological measurements", I would add tasks that go beyond the level of a doctorate in science.

The expected results and a brief description of the experiments conducted and described later in the text are presented.

The first chapter "Theoretical overview" begins with the presentation of the methods of collecting and analyzing data from psychological research (part 1).

It is obviously not the author's aim to present the methods themselves (experiment, quasi-experiment, case analysis, etc.), as it gives the impression that they are described not from the point of view of a psychological methodological text, but from a text sufficiently general, which explains alphabetic concepts. In my opinion, this rather simple description from a professional point of view would make sense only if some common or distinguishing characteristic with the MSS is sought.

The author continues with the Black Box method and Coombs' data theory, which are also presented relatively succinctly. The multidimensional scaling, as well as the nomothetic and idiographic research approaches, are presented in a little more detail.

After this text, the presentation of the author's concept of the comparative scan logically follows. This is done in the second part of the theoretical chapter. Here the PhD student details the development of his concept of comparative

scanning, which he initially considered as a "psychometric technology for the analysis of data related to the perception of static visual stimuli" (p.48), and in recent years developed and supplemented theoretically and supported empirically .

Drawing on Coombs' theory of preference choice, the PhD student defines comparative scanning as a multi-component, simultaneous cognitive process inherent to both humans and some artificial intelligence systems.

The second chapter is devoted to the computational toolkit and, in particular, to the software through which the MSS is implemented. This part is also presented in a development, which I will not comment on, since the text is quite technical in nature.

In the third chapter, the experiments realized by the doctoral student are presented, the purpose of which is to analyze the possibilities of the MSS for the solution of various research tasks. The description of the conducted experiments follows the same logical sequence: stimulus material, concise procedure, subjects, results and discussion.

Through these experiments, the possibilities of the MSS to solve various research tasks in different fields of practice are verified (psychophysics, aesthetics, psychological questionnaire, etc., a total of 12 experiments are described, each of which was implemented with a different number of persons).

I would like to comment on the description of the third experiment, which has remained the most unclear: this experiment was conducted using the IRRA computer program, presented in the appendix, through which the IAS and the Spielberger Personality and Situational Anxiety Questionnaire are implemented. This experiment retests the idea of an IAS applied to questionnaire items. The hypothesis is formulated in the terms of the IAS: "If a set of physical (visual) stimuli is selected from a pre-defined feature space, according to the requirements of the IAS, then in this space there exists a subspace - a reference zone of the person under investigation. In this zone are located the stimuli most likely to be preferred over all others if subjected to evaluation and forced choice by preference'.

But the stimuli in the questionnaire are evaluated meaningfully. How does this characteristic of them relate to the IAS?

I have to admit that from the description of this experiment it was not clear to me either what the participants were being told or what they were comparing, nor what the practical utility of the results was, other than possibly obtaining some configurations of similarities between items in the participants' subjective feature space. which is also compared at the level of group data (if I understood the idea correctly), thus integrating the data at the individual (idio-) and group (nomo-) level. Since the IRRA software, further down in the IRRA beta text, is the environment (probably) for the experiment, I think it should be at least briefly introduced through its functionalities, instead of the reader looking for information in the application.

Here, 438 participants were studied, divided into two age groups: 263 (over 35 years) and 175 (under 35 years).

Where exactly does the answer to fundamental question #9 follow, as the author claims? I quote: "Within Experiment 03, the answer to fundamental question #9 is this: with age, the intensity of the reference stimulus increases!" (p. 102). How exactly is this result determined?

I ask myself another question: from the point of view of our knowledge of man through his research with psychological questionnaires measuring certain personality characteristics, what else does the MSS give us? Where is the psychological knowledge in this case?

The remaining 9 experiments are described in the same laconic way, subject to the connection with the MCC, which the doctoral student is likely to present in the perspective of proving the practically limitless possibilities of the MCC for solving any tasks from any areas of psychology (and not only psychology), in which the main idea is to compare any objects by similarity and choices by preferences.

An interesting experiment was to examine preferences for three categories of textbook elements (text, image, diagram) using a textbook page and an eye-tracking device. 30 boys and girls from metropolitan schools between the ages of 15 and 19 participated.

I have a question: in these experiments, was the sequence effect controlled for? And if so, how?

From the brief presentation of the content of the dissertation work, it is clear that a huge amount of work has been done. The doctoral student complied with the recommendation to specify which of the experiments described in the text were implemented during the development of the dissertation work, which precede the topic. This information complements the individual historical perspective of the development of the MSS.

As I noted above, the PhD student has described a large number of experiments through which he elucidates various aspects of his method. He presented precisely what theoretical constructs this method is based on, correctly discussing its advantages and limitations compared to known similar methods.

The conclusion formulated by the doctoral student seems to me quite vague and mostly unconvincing: "The results obtained by the MCA in various fields of application are the basis for the interpretation, explanation and prediction of the complex behavior of the subjects and contribute to the expansion of the paradigm of psychometrics, as and for theoretical complementarity in the field of statistics" (p.176).

I suggest that he specify exactly what "expanding the paradigm of psychometrics" means, and as for the enrichment of statistics, I would not be able to judge, since this is not my field of study.

After completing the empirical part, the bibliography follows. 89 sources in Bulgarian and English are included here, of which 11 are self-citations. The bibliography is on the topic of the dissertation and reflects knowledge of the research problem in detail and in development.

The appendix includes 7 texts that are useful for understanding the content of the dissertation.

The abstract adequately reflects the content of the dissertation work. The main research achievements of the doctoral student are successfully summarized in the text.

EVALUATION OF CONTRIBUTIONS

Already in the introduction, the doctoral student announces that he has made a contribution to two sciences: "...contributes to the expansion of the paradigm of psychometrics, as well as to the theoretical complementation of statistics - through the specific mathematical algorithm of comparative scanning." If we accept this claim as true, we should reconsider the criteria for awarding the doctoral degree to this dissertation. I do not undertake to assess the enrichment of statistics, nor the mathematical algorithm of comparative scanning, as I am a psychologist and it is important to me to assess the contribution to psychological science of this dissertation.

I have been a reviewer of many dissertations (for doctor and for doctor of science), of many habilitations (for associate professor and professor), but until that moment I had never read 7 pages of contributions (183 - 189) and two pages (189 – 190) their summary. At the current level of development of the sciences, often one or two substantial contributions satisfy the criteria for a scientific level.

However, I cannot agree with the PhD student's claims of contributions, since he defines as contributions every result of every experiment he has conducted.

Without underestimating the work of the PhD student, I think the contributions can be summarized as follows:

1) Technological development of Coombs' Choice by Preference data theory;

2) Empirical verification of this technological development in multiple experimental studies that validate it in various content areas of psychology.

NOTES

I recommend translating all the designations in the tables (p. 232, 237, etc.), e.g. "light stimuli", "dark stimuli", as well as some terms: e.g. manual can be manual (for entering data) - p.208

P. 8 – the theoretical complementation of the spheres of psychometrics, as the doctoral student claims, should be argued;

I do not find it appropriate to present the results and the contributing elements already in the introduction, the same is my comment about the "importance of

the obtained results for practice". The introduction concludes by listing 5 signs of scientific novelty:

"…posing a new scientific problem; introduction of new scientific categories

and and concepts; revealing new regularities of phenomena or processes; application of new research methods, technologies, equipment and software; developing new scientific ideas about the world, man and society" - p. 28, which I also find inappropriate, since this is declarative, not evidential in nature.

These texts should be located at the end of the dissertation, where they would have the meaning of a summary of the obtained results (provided that all this is true and proved in the preceding text).

QUESTIONS

If, according to the IAS, the listed features for face recognition are a finite number, can this method be used in face recognition in witness statements - see the example on p. 257?

"Reference Stimulus" or Reference Point? The term "Reference stimulus" introduced by the doctoral student, in my opinion, contains an internal contradiction: a reference is something relatively constant, static, to which we relate a similar thing (eg, a reference group - this is the group to which we relate a given individual result obtained under the same parameters of comparing in a psychological test), a stimulus is something that affects or something that we value. The reference point in the individual feature space would be the point against which we evaluate a given stimulus.

Experiment 7: comparing circles by area and light/dark. If we transfer the stimulus material to another area and instead of the circles given in the example we use two identical rectangles, one of which is dark, the other - light, and it is necessary to refer to one of the two a third rectangle, which is half dark and the other half is light, what will be the nomo- and ideographic solution in the perspective MSS? To be specific: what does the answer to the question "the glass is half full or half empty" (according to the scheme described above) depend on (in terms of the method of comparative scanning)? I think that the theory of comparative scanning cannot answer such questions because their answer is not in the perception of objects.

In my opinion, it is good for the author to provide some clarity on the following issue: on the one hand, MCA is a method of data collection (equal to an experiment, quasi-experiment, interview, etc.), on the other - it is a new theory, on the third - a new data analysis method. How do the three cited categories relate?

How would the PhD student most briefly compare his method to the choice-by-preference method and to the comparison of three objects in multidimensional scaling?

CONCLUSION

The dissertation, presented by Ivaylo Panov, contains scientific and applied results that represent an original contribution to science and meet the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the regulations for its implementation.

The dissertation work was carried out at a high professional level and shows that the doctoral student Ivaylo Panov has in-depth theoretical knowledge and professional skills in scientific specialty 3.2. Psychology (General psychology, psychodiagnostics) by demonstrating qualities and skills for independent conduct of scientific research.

Based on the above, I positively evaluate the realized research work presented in the dissertation work, the author's abstract and the publications presented by the doctoral student and declare that I will vote positively to award the educational scientific degree "Doctor" to Ivaylo Panov.

04/20/2023   Reviewer:

Sofia   (Prof. E. Alexieva)