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Introductory Chapter: The Research Trend and Applications in Behavior Analysis

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1. The applications in behavior analysis

As the era of big data and artificial intelligence has come, many research fields are heading toward more precise process analyses. In particular, using innovative methods to analyze different human behaviors as well as to understand specific behavioral patterns help exploring the structures and contexts in all kinds of human behaviors, which can serve as theoretical innovation and strategies to solve human problems. So far, behavior analysis is gradually emphasized in many research fields, including education, human-mechanism interaction, learning science, psychology, sociology, guidance and counseling, marketing and management, etc.

Many research methods have different characteristics in exploring the unknown; for instance, experiment research emphasizes the foundation of positivism. The author believes that behavior analysis focuses on the exploration in latent structures of human behaviors and interactions, which should be based on structuralism. Simon Blackburn suggests that the structuralism is "the belief that phenomena of human life are not intelligible except through their interrelations. These relations constitute a structure, and behind local variations in the surface phenomena there are constant laws of abstract culture" [1]. Based on this philosophy, behavior analysis research, exploring the potential structure in human behaviors, helps connect human behavioral structure and their basic physiological and cognitive structures, which further helps investigate how these behaviors influence social interactions, and even the structure of social organization interactions.

More and more analysis techniques are applied in integrating qualitative and quantitative analysis methods to analyze behavioral process based on structures, including sequential analysis [2], progressive sequential analysis [3], quantitative content analysis [4, 5],

cluster analysis or data mining [6], social network analysis [7], etc. Many other studies also keep developing innovative analysis techniques to integrate multi-dimensional research methods and overcome challenging research difficulties, such as self-report-based sequential analysis (SRSA), exploring behavioral structures in learners' self-reports from their learning behavioral sequential patterns [8]. This technique can further explore the causes of learners' specific learning behaviors and sequences. On the other hand, this innovative analysis method can be applied in all types of research issues across disciplines.

2. Example: Studies of learning behavior analysis

Take learning science, for example, many studies in education discipline have applied sequential analysis and content analysis to understand learners' behavioral patterns in learning and interaction (e.g., [9]–[11]). Behavior analysis is applied in many research topics, such as learners' discussion process or content analysis in computer-supported collaborative learning, CSCL [10], users' operation behaviors, and discussion behaviors in game-based learning activities [5, 9]. Overall, behavior analysis research in education discipline includes two dimensions.

The first type is exploring the potential structure of human behaviors in specific fields (e.g., [9, 12]).

The second type is developing innovative behavior analysis techniques or coding systems to analyze complex human behaviors (e.g., [3, 8, 13]).

The former type belongs to the deeper exploratory research, which does not have statistical presumptions about research hypothesis but discovers new patterns by collecting a large amount of data for behavior analysis and exploring all the possible structures. The latter type is more about the innovation in research methods and instruments. These two research types that the author categorizes above can also be applied in the behavior analysis research of other disciplines. These two research types need to work together to improve research method innovation and the quality of latent structure analysis. These studies are expected to contribute in exploring all kinds of behavioral structures that have not been discovered. Especially in the era of big data, techniques and speed of calculations keep improving, which has an important meaning in the development of behavior analysis. More precise behavior analysis research can help us explain the structures/patterns in big data and discover more complex but important issues with solutions. On the other hand, less precise behavior analysis research or the one without progress may negatively influence our lives because our decisions or judgments will be automatically processed through inaccurate behavior analysis in the era of artificial intelligence.

This book collects the latest behavior analysis research in different disciplines, including some methods or analysis examples as references for the readers, who are interested. These research outcomes and analysis methods help the readers better understand the theories and practices of behavioral pattern analysis.

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References

[1] Blackburn S. Oxford Dictionary of Philosophy, Second Edition Revised. Oxford: Oxford
University Press; 2008

[2] Bakeman R, Gottman JM. Observing Interaction: An Introduction to Sequential Analysis.
2nd ed. UK: Cambridge University Press; 1997

[3] Hou HT. Exploring the behavioural patterns in project-based learning with online dis-
cussion: Quantitative content analysis and progressive sequential analysis. Turkish
Online Journal of Educational Technology. 2010;**9**(3):52-60

[4] Rourke L, Anderson T. Validity in quantitative content analysis. Educational Technology
Research and Development. 2004;**52**(1):5-18

[5] Hou HT. Exploring the behavioral patterns of learners in an educational massively multi-
ple online role-playing game (MMORPG). Computers & Education. 2012;**58**(4):1225-1233

[6] Hou HT, Li MC. Evaluating multiple aspects of a digital educational problem-solving-
based adventure game. Computers in Human Behavior. 2014;**30**:29-38

[7] Scott J. Social Network Analysis: A Handbook. London: SAGE Publications; 2000

[8] Lin YC, Hsieh YH, Hou HT. Developing a self-report-based sequential analysis method
for educational technology systems: A process-based usability evaluation. Journal of
Educational Computing Research. 2015;**53**(1):95-123

[9] Hou HT. Integrating cluster and sequential analysis to explore learners' flow and behav-
ioral patterns in a simulation game with situated-learning context for science courses: A
video-based process exploration. Computers in Human Behavior. 2015;**48**:424-435

[10] Wang SM, Hou HT, Wu SY. Analyzing the knowledge construction and cognitive pat-
terns of blog-based instructional activities using four frequent interactive strategies
(problem solving, peer assessment, role playing and peer tutoring): A preliminary study.
Educational Technology Research and Development. 2017;**65**(2):301-323

[11] Hou HT, Wu SY. Analyzing the social knowledge construction behavioral patterns of an
online synchronous collaborative discussion instructional activity using an instant mes-
saging tool: A case study. Computers & Education. 2011;**57**(2):1459-1469

[12] Jeong AC. The sequential analysis of group interaction and critical thinking in online threaded discussions. American Journal of Distance Education. 2003;**17**(1):25-43

[13] Gunawardena C, Lowe C, Anderson T. Analysis of global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. Journal of Educational Computing Research. 1997;**17**(4):397-431