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THE ROLE OF INDUCTIVE THINKING IN FORMING CAUSE-AND-EFFECT RELATIONSHIPS IN CHILDREN

Mirazimova Muxabbat Normatovna

Department of Preschool Education Theory and Methodology at Jizzakh State Pedagogical University, Uzbekistan

ABSTRACT

This thesis examines the role of inductive thinking in forming cause-and-effect relationships in children. The relevance of the topic is determined by the fact that causal understanding is one of the central foundations of cognitive development, since it allows children to explain events, predict outcomes, and regulate their actions in relation to the surrounding world. The purpose of the study is to clarify how inductive thinking supports the formation of children's causal reasoning and to identify the psychological and pedagogical conditions that make this process effective. The study is theoretical and is based on analysis, comparison, and synthesis of classical and contemporary works in developmental psychology and early childhood education. The findings show that inductive thinking enables children to move from repeated observations of particular events to broader conclusions about regularity, dependence, and consequence. This process is closely connected with active exploration, dialogic guidance, explanatory speech, and executive regulation. It is concluded that inductive thinking is a major developmental mechanism through which children begin to understand why events occur and how one phenomenon can produce another.

Keywords: Inductive thinking, cause-and-effect relationships, children, cognitive development, preschool education, causal reasoning, inquiry, executive functions.

INTRODUCTION

The development of children's thinking is inseparable from their ability to perceive causal relations. A child who understands only isolated events remains limited to immediate impressions, while a child who begins to see why something happens acquires a more organized and predictive understanding of reality. In early childhood, this transition is especially important because it marks movement from simple observation toward explanation, anticipation, and intentional action. Research in child development shows that young children build explanatory systems rather than merely accumulate separate facts, and these systems help them predict, interpret, and reason about their environment.

Inductive thinking plays a key role in this process because children do not begin with abstract causal laws. They encounter repeated situations, compare outcomes, notice regularities, and gradually infer that one event leads to another. In educational settings, this means that causal reasoning develops most productively when children are allowed to observe, compare, ask questions, test expectations, and discuss results. The purpose of this thesis is to analyze the developmental role of inductive thinking in forming cause-and-effect relationships in children and to explain the psychological mechanisms underlying this process.

This thesis is based on theoretical analysis of major works in developmental psychology, cognitive science, and preschool pedagogy. The material includes classical studies by Piaget and Vygotsky, as well as more recent research on children's causal learning, inquiry, executive functions, and systems thinking. The study used conceptual analysis to clarify the relationship between induction and causal understanding, comparative interpretation to relate different theoretical traditions, and synthesis to derive pedagogical implications. Since the goal was to explain a developmental mechanism rather than measure an intervention, theoretical methodology was considered appropriate.

The analysis shows that inductive thinking is one of the main mechanisms through which children begin to form cause-and-effect relationships. Piaget's constructivist theory explains this well: children actively construct knowledge through interaction with objects and events, and their understanding develops through the coordination of action and experience. From this standpoint, causal understanding does not appear as a ready-made concept. It emerges when the child repeatedly observes sequences, compares situations, and begins to infer stable relations between actions and outcomes. Induction is therefore psychologically grounded in the child's natural movement from concrete cases to broader understanding.

A second important result is that the formation of causal relations is strongly mediated by language and social interaction. Vygotsky's theory demonstrates that children's higher mental functions grow through communication and guided participation. In the case of causal reasoning, adults help children notice relevant features, distinguish essential from accidental events, and express explanations in words. Everyday conversations are especially important because children's questions often focus on why things happen, and adult explanations provide a bridge between direct experience and generalized understanding. Research on preschoolers' questions and parents' explanations confirms that causal thinking develops within real communicative activity rather than outside it.

The study also shows that inductive thinking supports causal reasoning because it organizes knowledge through pattern detection. When children repeatedly see that pouring water nourishes a plant, that pushing an object changes its position, or that removing support causes something to fall, they begin to

abstract regularity from repetition. Sobel and colleagues argue that discovery-based activity is particularly important for learning causal structure because guided discovery helps children identify how variables are related rather than merely remember results. This confirms that induction has a developmental function extending beyond factual knowledge into genuine explanation.

Another result concerns the link between induction and inquiry. Gelman and Brenneman show that young children are capable of science-related learning pathways that include observation, comparison, and explanation. Framed in developmental terms, these are also pathways of causal learning. Children do not simply register events; they search for relations among them. This is why induction becomes a basis for both cognitive growth and school readiness. Through repeated exploration, children learn not only what happened but how and why it happened, which is essential for meaningful reasoning.

The findings further indicate that executive functions strengthen the role of inductive thinking in causal development. To infer cause and effect, children must hold several features in mind, inhibit impulsive interpretations, shift attention when evidence changes, and compare previous outcomes with present events. Carlson's research on preschool executive function shows that these regulatory capacities develop rapidly during early childhood. This means that causal reasoning is supported not only by conceptual growth but also by the maturation and stimulation of self-regulation. Induction thus becomes both a cognitive and regulatory process.

The results suggest that inductive thinking is especially valuable in early childhood because it corresponds to the developmental form of children's reasoning. Young children first understand causality in visible, repeated, and concrete situations. Their early explanations are often incomplete, but they become more stable when supported by comparison, discussion, and repeated return to similar patterns. Research on continuous causal processes shows that children's ability to predict, observe, and explain causes develops through active engagement with phenomena from domains such as physics, biology, and chemistry. This supports the view that causal understanding is not restricted to one content area but reflects a broader cognitive capacity.

The pedagogical implication is that teaching should not begin with abstract statements about rules and laws. Instead, children need rich opportunities to observe transformations, compare cases, ask why-questions, and test simple explanations. This does not mean leaving learning unstructured. On the contrary, adult guidance is essential for helping children focus on relevant evidence and verbalize emerging conclusions. Studies of systems thinking in preschool children also show that even at four to six years of age, children can build linear and multi-step cause-and-effect relations when the learning context is accessible and well organized.

This thesis demonstrates that inductive thinking plays a central role in forming cause-and-effect relationships in children. It enables the child to move from particular observations to generalized understanding of dependency, consequence, and regularity. The process is strengthened by active exploration, social mediation, explanatory language, and executive regulation. Therefore, inductive thinking should be regarded as one of the key psychological and pedagogical foundations of children's causal development, especially in preschool education, where knowledge grows from direct experience into structured understanding.

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