



# Knowledge claims in cognitive development research: Problems and alternatives



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## ARTICLE INFO

### Article history:

Received 20 January 2015

Received in revised form

15 March 2016

Accepted 16 March 2016

Available online 1 April 2016

### Keywords:

Cognitive development

Conceptual development

Discursive psychology

Numerical cognition

Numerical thinking

Interactivism

Epistemology

## ABSTRACT

Children's knowledge is often characterized in short propositional statements, e.g., a child may be claimed to *know how counting works*. This article analyzes the use of these knowledge claims in cognitive development research on children's understanding of numbers and counting. In this research, attempts to characterize children's knowledge in terms of knowledge claims are repeatedly invalidated by children's inconsistently normative uses of counting. This suggests that rather than describing cognitive structures/states, knowledge claims describe whether, in a certain domain, a person has a disposition to behave normatively (i.e., in a way that fits a consensually established standard of how things are appropriately done). Given that children's developing behavior is, by definition, inconsistently normative, knowledge claims can only characterize what research studies on children's conceptual knowledge presuppose—the incomplete normativity of children's behavior. Following the identification and explanation of this problem, several viable alternative approaches to the study of children's knowledge are described. The diversity of these alternatives reflects the need to disentangle descriptions from explanations, and discursive abstractions about cognitive processes from the processes themselves.

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## 1. Introduction

The development of conceptual knowledge in preschool children is a prominent topic in theory and research on human development. One prominent approach to this topic asks research questions such as *When do children know the meaning of number words?*, *When do children understand that objects exist when they are out of view?*, or *How can we determine whether a child truly knows how counting works?* As the example questions illustrate, this research approach characterizes developing conceptual knowledge in terms of propositional statements involving the verbs *know* or *understand*—referred to here simply as *knowledge claims*.<sup>1</sup> The goal of the current article is to analyze and critically assess the use of these characterizations as tools for scientific research about

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<sup>1</sup> Knowledge claims are claims about what a person knows that use various forms of the verb *to know* (as well as related verbs such as *to understand*, *to be aware*, etc.) accompanied by a propositional expression of what is known. For example, the claim that a person *knows that the world is round* would be a knowledge claim. Knowledge claims do not refer to claims about knowledge that do not characterize the knowledge itself propositionally. For example, the claim that *knowledge is adaptive* would not be a *knowledge claim*, as the term is used in this article.

cognitive development. While knowledge is undeniably a relevant concept for cognitive development, much can be gained through a critical appraisal of a particular way of conceptualizing or characterizing knowledge (exemplified by the above question) as a tool for scientific inquiry.

This article analyzes the use and consequences of knowledge claims in a series of research studies that focus on young children's developing conceptual knowledge of numbers and counting. The focus on these particular studies is intended to facilitate close analysis by providing a consistent, specific and detailed source of examples. The arguments developed herein are intended to be applicable to the use of knowledge claims in cognitive development research in general.

Organizationally, the article begins with a description of the assumptions and meta-theoretical foundations that characterize the cognitivist research that is the focus of this paper. Next, there is a general overview of the use of knowledge claims in this research, followed by a close analysis of the way that this research conceptualizes the relation between knowledge and behavior, and addresses the (resulting) issue of how to make valid inferences about knowledge on the basis of behavior. Based on this analysis, conclusions are drawn about knowledge claims and their potential to characterize young children's conceptual knowledge. Finally, as a

way around these limitations, and based on their implications for the study of knowledge in children, three viable alternative ways of conceptualizing knowledge are described.

### 1.1. Knowledge as a generative source for behavior

The previous examples of research questions about children's knowledge of number words and counting are meant to be representative of the research that is critically analyzed in this paper. These studies exhibit several common qualities, both of which are typical of an approach to research informed by Chomsky's (1965) performance-competence distinction. First, they attempt to infer the hidden structural or generative basis for behavior, i.e., the underlying conceptual structures that guide children's use of numbers and counting. This is very much in line with cognitivism's goal of going inside the black box, and inferring the hidden mechanisms of thought and behavior. In contrast to discourse-focused or interaction-centric approaches such as (Edwards, 1993; Edwards & Potter, 1992; Harré & Gillett, 1994; Potter & Wiggins, 2007; Sford, 2008), or dynamic systems theory (Thelen, 2005) which embrace the concrete or situated appearances of behavior, the research reviewed here treats observed behavior as a possibly distorted reflection of hidden cognitive processes. This approach is clearly seen in cases in which researchers, drawing in part on Chomsky's (1965) competence-performance distinction, attempt to determine whether children really understand what they are doing when they are using numbers or counting, or if they are simply following a learned script by rote. Numerous examples of this approach are discussed in the upcoming sections.

### 1.2. Propositional characterizations of knowledge

The second quality of the cognitive development research critically analyzed herein is that it characterizes children's knowledge in terms of propositional knowledge claims, i.e., propositional statements involving the verbs *know* or *understand* (e.g., she knows the meaning of the number three). These statements are not a peripheral part of this research, but its central explanatory concepts.

Propositional knowledge claims (from here on referred to simply as *knowledge claims*<sup>2</sup>) are commonly made in everyday life (e.g., she knows what a soccer ball is), and may also be found in psychological research studies. The question of whether and how knowledge claims are appropriate or useful tools for cognitive development researchers studying children's developing conceptual knowledge (and if not, what a better alternative might look like) is what this paper intends to examine.

The research critically analyzed in the upcoming sections is characterized by both of the previously described qualities. That is, it attempts to infer the generative conceptual basis for children's use of numbers and counting, and at the same time, characterizes this conceptual basis in terms of knowledge claims. The choice of studies that focus on children's use of numbers and counting primarily serves to maintain an appropriate and consistent reference point for critiquing the specific approach to cognitive development described in Sections 1.1 and 1.2. These studies are not representative of the broader field of cognitive development research on numerical knowledge. In fact, they represent a specific program of research, drawing on Chomsky's (1965) distinction between

competence and performance.

Elsewhere, it has been claimed that these approaches commit a sort of category error insofar as they conflate descriptions of developmental processes with explanations of these processes (Campbell & Bickhard, 1986). Such a conflation is problematic in two ways. First, descriptions are insufficient as explanations insofar as they cannot, by themselves constitute an explanation. This insufficiency is clearly illustrated by Ryle's (1949) and (more subtly) Wittgenstein's (1953) arguments about the problematic conflation of reasons and causes, which for the present purposes are equivalent to descriptions and explanations. Ryle's argument can be illustrated with the example of the game of chess. The descriptions of the game, in the form of rules, are insufficient to explain how the game is played. The rules simply describe the game itself. In short, the rules do not constitute an explanation because the rules themselves cannot play the game of chess.

Campbell and Bickhard (1986) develop this argument, claiming that descriptions of capacities have been misapplied as descriptions of knowledge in the form of internal representations (p. 66). They argue that, in addition to descriptions of capacities not constituting explanations, they also do not even constitute descriptions of *knowledge* itself, in the sense of describing some structure that guides an organism along a behavioral trajectory.

The present article provides a detailed explication of the latter problem, using a specific program of cognitive development research to give clear evidence of how knowledge claims are descriptions of capacities, showing how these descriptions are problematic as characterization of knowledge, and finally, using this research and its critique as a context for consideration of possible solutions. The present article also expands this critique by showing previously unanticipated problems with the use of knowledge claims to account for children's behavior. Going beyond Campbell and Bickhard's (1986) argument about the need to separate of capacity descriptions from descriptions of knowledge, the current paper shows that, in the case of children's developing conceptual knowledge, capacity descriptions are problematic even as capacity descriptions. The exploration of these issues in the current paper is intended to develop recognition of the issues involved with conceptualizing and studying knowledge in scientific research, particularly with regards to children.

The conflation of descriptions (and especially capacity descriptions) with explanations are problematic. It is crucial for psychology that these be resolved—ideally in a way that provides insights on and broader awareness of the complex and confused relationship between cognitive and discursive phenomena, both of which are parts of psychology's subject matter. Such a resolution would be useful in constructively and coherently relating a more mechanistic approach to psychology, and a more discursively oriented side of the field, a split that has been recognized consistently throughout the history of psychology, from the time of Wundt (Boring, 1950), to the modern era (Cahan and White, 1992; Rommetveit, 2003). Although the current paper examines these issues in the context of the use of knowledge claims within a specific body of cognitive development research, they arise throughout psychology.

## 2. The use of knowledge claims in research

Research on children's developing use of numbers and counting studies the answers that children give to quantitative questions

<sup>2</sup> The use of *knowledge claims* is intended to refer specifically to claims about knowledge in which what is claimed to be known is described propositionally. In other words, knowledge claims involve statements of the form "knowing that X" or "knowing how to Y". In both cases, what is known is treated propositionally.

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