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Ecological Commitments: Why Developmental Science Needs Naturalistic Methods

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Abstract

Much of developmental science aims to explain how or whether children's experiences influence their thoughts and actions. Developmental theories make assumptions and claims—what I call *ecological commitments*—about events outside research contexts. In this article, I argue that most developmental theories make ecological commitments about children's thoughts, actions, and experiences outside research contexts, and that these commitments sometimes go unstated and untested. I also argue that naturalistic methods can provide evidence for or against ecological commitments, and that naturalistic and experimental studies address unique yet complementary questions. Rather than argue for increasing the ecological validity of experiments or abandoning laboratory research, I propose reconsidering the relations among developmental theories, naturalistic methods, and laboratory experiments.

Keywords

naturalistic methods; experimental methods; developmental theory

Most of children's experiences, thoughts, and actions take place outside laboratories. Correspondingly, most theories in developmental psychology aim to explain phenomena that occur in children's everyday lives, such as how children make moral judgments or how children decide whom to befriend. In aiming to explain phenomena outside research contexts, developmental theories make what I call *ecological commitments*: hypotheses, assumptions, and implications about what happens in children's lives outside research contexts.

In this article, I argue that the ecological commitments of theories often go unstated and untested, and that naturalistic methods are uniquely suited to evaluate ecological commitments. I do not argue for increasing the ecological validity of experiments or abandoning the experimental method, but for reconsidering the relations among developmental theories, experiments, and naturalistic methods. Specifically, I argue that, in seeking to explain phenomena outside research contexts, developmental theories are committed to ecological commitments about what takes place in children's everyday lives. Next, I propose that naturalistic methods are uniquely suited to test ecological commitments,

and that naturalistic and experimental methods serve complementary roles in developmental science.

Explaining Everyday Developments as a Goal of Developmental Science

Developmental researchers commonly hold and express the goal of explaining everyday phenomena. Basic developmental researchers are particularly likely to hold this goal because their aim is often to understand what children do, think, or experience, and how they come to have these characteristics. Since most of children's experiences, thoughts, and actions take place outside research contexts, claims about what children do, think, and experience, and how they come to have these characteristics will, to a large extent, refer to events that occur outside research contexts.

The aim of explaining phenomena outside research contexts is often stated most clearly in the opening and closing paragraphs of articles. For example, in their groundbreaking article on infants' preferences for helpful agents, Hamlin, Wynn, and Bloom (1) write: "The capacity to evaluate other people is essential for navigating the social world ... but the ontogenetic origins and development of this capacity are not well understood" (p. 557). The authors propose that infants' preferences for helpful agents are important in part because they make it possible for older children and adults to navigate the social interactions in which they participate. A second example comes from Kochanska's influential work: In an article on children's early signs of guilt, Kochanska, Gross, Lin, and Nichols (2) conclude: "By and large, the findings supported the view that guilt has an adaptive function in social development because it helps prevent conduct that violates rules" (p. 479). Again, one overarching goal of this research is to explain a general phenomenon not limited to research contexts—in this case, children's violation of rules.

These are but two examples of how developmental researchers commonly express the aim of explaining everyday phenomena. Insofar as a theory is committed to claims about events outside the research context, we may ask: What specifically is being proposed about what is happening in children's everyday lives? That is, what are the ecological commitments of the theory?

Two Types of Ecological Commitments

The ecological commitments of a theory are the hypotheses, assumptions, and implications about nonresearch contexts to which the theory is *committed*.¹ That is, ecological commitments are claims that must be true for the theory to be true. As suggested earlier, developmental psychology is rife with ecological commitments: Basic developmental research often aims to explain everyday phenomena by claiming that phenomena outside

¹The notion of ecological commitments builds on Quine's concept of *ontological* (existential) commitments (3), which refers to the kinds of entities that have to exist for a theory or claim to be true. For instance, Quine (3) argued that a person who says, "There are prime numbers between 1000 and 1010" is thereby *committed* to the claim that numbers exist. Ecological commitments may be stated in words ("Infants between 12 and 18 months typically help several times per week") or as distributions of variables ($h_{ij} \sim \text{Pois}[\lambda_j]$, where h_{ij} is the number of times child i helped on week j and $\text{probability}[\lambda_j = 2] = 90\%$). Although most of the research discussed in this article involves quantification of independent and dependent variables, ecological commitments are also involved in qualitative research.

research contexts resemble phenomena studied in a laboratory, while general statements like “children do/think/encounter X” entail commitments about what happens in children’s lives.

To start with a simple fictional example, imagine that a theorist proposes an explanation for why children’s understanding of others’ false beliefs seems to improve between 4 and 9 years (4). The explanation proposed by the theorist is that children understand false beliefs because they repeatedly see other people looking for objects in the wrong place. The ecological commitments of this theory would include the claims that children observe people looking for objects in the wrong location in everyday life and children do not understand false beliefs in everyday life (or in the laboratory) until after they have seen enough instances of people searching for objects in the wrong location. These ecological commitments would be false if children do not observe searches for wrong objects in everyday life or if most children at these ages typically understand false beliefs in everyday life regardless of whether they have observed any failed searches.

This fictional example includes two major categories of ecological commitments: commitments about what children do (e.g., their thoughts, actions, or emotions) outside research contexts and commitments about the distribution of children’s experiences (e.g., how often they observe certain events, if at all) before demonstrating the relevant thoughts, actions, emotions, or other characteristics. In much developmental research, the first is the *explanandum*—the phenomenon to be explained—and the latter is part of the *explanans*—the collection of facts used to explain the phenomenon.

Ecological Commitments About What Children Do

This first type of ecological commitment is about what children do and do not do when they are not participating in research. For instance, theories have made contrasting claims about whether infants help or participate in everyday chores (5–7), and whether infants use force mainly when provoked or whether they also hit or bite others without provocation (8–10). These claims form key parts of contrasting views of social development. Other examples include commitments about what kinds of signs of guilt or shame children show at different ages (11) or the causes of social conflicts (e.g., linguistic preferences; 12).

Ecological Commitments About Distributions of Experiences

The second type of ecological commitment pertains to the distribution of children’s experiences before demonstrating certain thoughts, emotions, actions, or other capabilities. This type of commitment is theoretically central to arguments about what *does* contribute to a particular development (e.g., events that happen in everyday life) and to arguments about what *does not* contribute to that development (e.g. events that do not happen in everyday life). Illustrating the latter, claims that certain capacities are innate are commonly based on the argument that children show these capacities before relevant experiences have taken place (13). The latter claim amounts to an ecological commitment that relevant events do not occur in everyday life prior to a certain age. Several contemporary theories claim a lack of certain experiences before the emergence of sociomoral evaluations (14), helping behaviors (7), object concepts (15), and language skills (12, 16, 17).

Both types of ecological commitments can incorporate cultural variability. The scope of a commitment can vary from highly specific (children in this group, in this place, and at this time do/think/experience X) to universal (children do/think/experience X). The scope of the commitment entails the type of evidence needed to evaluate the commitment: If a theory proposes that something occurs universally, it cannot be fully evaluated using evidence from a single group.

Empirical Testing of Ecological Commitments

Empirical testing requires explicit statements of the ecological commitments of a theory. Conversely, when commitments are merely implied, they are often difficult to evaluate. For instance, some theories argue that infants lack the relevant experiences prior to demonstrating a characteristic without specifying what those relevant experiences might have been. Spencer and his colleagues (13) argue that it can be challenging to determine what counts as relevant experiences. They cite research (18) on chicks' visual predisposition to approach objects that look like individuals of the same species. Although this predisposition develops even in chicks raised in darkness, it depends on receiving one of several nonvisual experiences (e.g., running in a wheel; 19). Such unexpected or nonobvious (13) connections between experiences and development make it all the more important to state ecological commitments explicitly so theories can be tested empirically.

Ecological commitments are about what happens outside research contexts. Hence, no research method can determine with absolute certainty whether ecological commitments are true. Being observed by a researcher can influence the thoughts and behaviors of participants in a study (20). However, some research methods are better suited to test ecological commitments than others. Willems (21) classified research activities along two dimensions: the degree to which the researcher influences the context (e.g., by exposing participants to specific stimuli) and the degree to which the researcher imposes units of behavior (e.g., by forcing participants to choose between two responses). The less the researcher influences the context and the behavioral units of the participant, the closer the context will be to a nonresearch context. Methods low on both of Willems's dimensions, and thus that approximate nonresearch contexts maximally, are typically referred to as *naturalistic* methods.² (Not all *observational* methods are naturalistic: In the common method of structured observations, the setting is constrained through standardization and may not resemble what children typically encounter; 23.)

Using Naturalistic Methods To Test Ecological Commitments

Naturalistic methods are methods by which researchers study events that were not purposely influenced or constrained by the researcher. The canonical naturalistic method is naturalistic observation in which a trained researcher observes and describes events of interest as they occur (24–27). However, technological advances have expanded naturalistic methods to include high-definition video recording of interactions (6), audio recording of speech (28),

²Naturalistic methods serve other roles in developmental science, for instance in the development of theories (22), and naturalistic methods are not the *only* methods that can help researchers evaluate ecological commitments. However, due to space constraints, I focus here on using naturalistic methods to test ecological commitments.

head-mounted cameras to track children's gaze during interactions (29, 30), robots testing models of natural social interaction (31), and methods to analyze naturally occurring motor activity in infants (32). Relatedly, new ways of storing and sharing videos (e.g., the *Databrary* initiative) may allow researchers to test hypotheses using naturalistic data that have already been collected (33).

The suitability of naturalistic methods for testing ecological commitments is independent of the ability of naturalistic methods to assess causality. Experimental methods are typically preferred for demonstrating causal relations (34), although nonexperimental data can also provide convincing evidence of causal relations (35). However, ecological commitments are not about what causes what, but about what happens outside research contexts. Certain changes in one (independent) variable may cause changes in another (dependent) variable. But if those changes in the independent variable never occur in a child's environment, they cannot explain developmental changes in the dependent variable. Experiments show what can happen, not what does happen, in children's lives (36).

Using naturalistic methods to test ecological commitments is rare, but examples exist, for instance in research on language development. Skinner (37) proposed that children learn language by receiving corrective feedback from their parents. A crucial ecological commitment of this theory was that parents commonly correct children's ungrammatical utterances. This ecological commitment was challenged by Brown and Hanlon's (38) analysis of naturalistic speech between parents and children, which suggested that explicit corrections of children's ungrammatical utterances are too rare to explain how children acquire grammar (16).

Research on infants' helping behavior provides a second example of how naturalistic research can test ecological commitments. By some accounts, children have a natural tendency to help others, independent of experiences with helping. For instance, in one study, researchers proposed that "infants 18 months of age are too young to have received much verbal encouragement for helping from parents" (39, p. 1302). Other theorists have emphasized that parents scaffold infant helping (5). To evaluate these contrasting ecological commitments, one study videotaped naturally occurring interactions in the homes of U.S. middle-class families (6): Most infants were encouraged to help, consistent with the ecological commitments of scaffolding. This naturalistic evidence does not suggest a causal relation between encouragement and infant helping (see subsequent discussion), but does raise the possibility that parental encouragement contributes to the emergence of infant helping.

The Shortage of Naturalistic Research

Several developmental researchers have called for more research on children's everyday contexts (36, 40, 41). One might therefore think that evidence for evaluating most ecological commitments is available. Indeed, Bronfenbrenner (41) noted a general increase in studies in real-life settings between the mid-1970s and the mid-1980s. However, like Bronfenbrenner himself, we should not "rest content" (p. 289).

The first reason is that the increase in naturalistic research may not have been sustained. As a rough measure of the use of naturalistic methods, I calculated the articles in seven developmental journals containing the word *naturalistic* in the title, abstract, key words, or other descriptors (Figure 1). The proportion of such articles increased up to the mid-1980s, consistent with Bronfenbrenner's (39) observation, then declined. Over the past 10 years, fewer than 1% (39 of 5,948) of the articles had the word *naturalistic* in their descriptors.

The second reason we should not rest content is that naturalistic research by itself does not guarantee testing of ecological commitments. It is possible to complete detailed descriptions of naturally occurring events that do not answer any theoretically interesting questions. For instance, if Brown and Hanlon (38) had merely reported the number of times the letter "a" appeared in their transcripts of speech between parents and children, they would not have been testing any ecological commitments. Rather, such a study would represent what Bronfenbrenner (39) called "context without development" (p. 288): description for the sake of description without regard for testing or developing theories.

The Complementary Roles of Naturalistic and Experimental Methods

Ecological commitments alone do not constitute a theory and naturalistic methods alone do not prove a theory. Naturalistic, experimental, and other methods answer distinct questions and have different strengths and limits (21, 36, 42). The virtues of randomized experiments for testing causal hypotheses are well known. Moreover, experimental and laboratory methods can often assess individual characteristics (e.g., children's cognitive abilities) more precisely than can naturalistic methods (42). The complementary strengths and weaknesses of different methods can be exploited in research. For instance, naturalistic methods can indicate whether two variables covary in everyday life, whereas experimental methods can indicate whether one variable causes changes in the other (40). Following up on the naturalistic finding that parents encourage infant helping (6), in an experimental study, encouragement and praise increased infant helping (43).

The complementary roles of naturalistic and experimental methods are rarely noted in contemporary developmental science. Textbooks often refer to experiments as the ideal method for testing causal hypotheses in basic developmental research (44) or as the gold standard of psychological research (45). In contrast, in this article, I have argued that some hypotheses (i.e., the ecological commitments of a theory) are both theoretically crucial and logically impossible to test using randomized experiments. In this light, naturalistic methods are not just the methods of last resort, but serve functions separate from and complementary to those served by experimental and laboratory methods.

The high value placed on experiments has likely contributed to the shortage of naturalistic studies testing ecological commitments. Another factor may be that the findings of naturalistic studies are sometimes considered obvious or trivial, since we already know what happens in everyday life. The trouble with this line of reasoning is that what seems obvious before data are collected is sometimes false, while what seems obvious after data are collected may not have seemed so obvious beforehand. Also, what is obvious to one person may not be obvious to another. I have seen the same naturalistic findings described by two

different reviewers as obviously true and obviously false. In empirical science, intuitions normally take a back seat to data.

A second type of critique is that a given naturalistic study investigates only certain contexts or codes certain variables. For instance, a critic may argue that the findings for one cultural group may differ from the findings for a different cultural group, or that a study focused on parent-child interactions should also have coded peer interactions. While naturalistic studies may be especially prone to eliciting such concerns from reviewers, the concerns apply equally to laboratory studies, which are typically limited to a single context and a few variables. Regardless of method, questions about contextual variability and comprehensiveness provide reasons for conducting additional research and being cautious when drawing general conclusions from a single study. However, such questions should not deter the publication of naturalistic research unless the scientific community is willing to apply similar requirements to laboratory experiments.

Conclusion

In this article, I have argued that most developmental theories make ecological commitments about children's thoughts, actions, and experiences outside research contexts and that these commitments sometimes go unstated, making them difficult to evaluate. I have also argued that naturalistic methods offer promising ways to provide evidence for or against ecological commitments, and that naturalistic and experimental research answers unique yet complementary questions. When combined systematically, these different methods can yield important insights into how children develop. I have made these arguments while assuming little about the theoretical outlook of researchers. All theories that seek to explain developmental phenomena in real-life contexts inevitably contain both causal hypotheses and ecological commitments, and their fate is inextricably tied to both randomized experiments and naturalistic studies.

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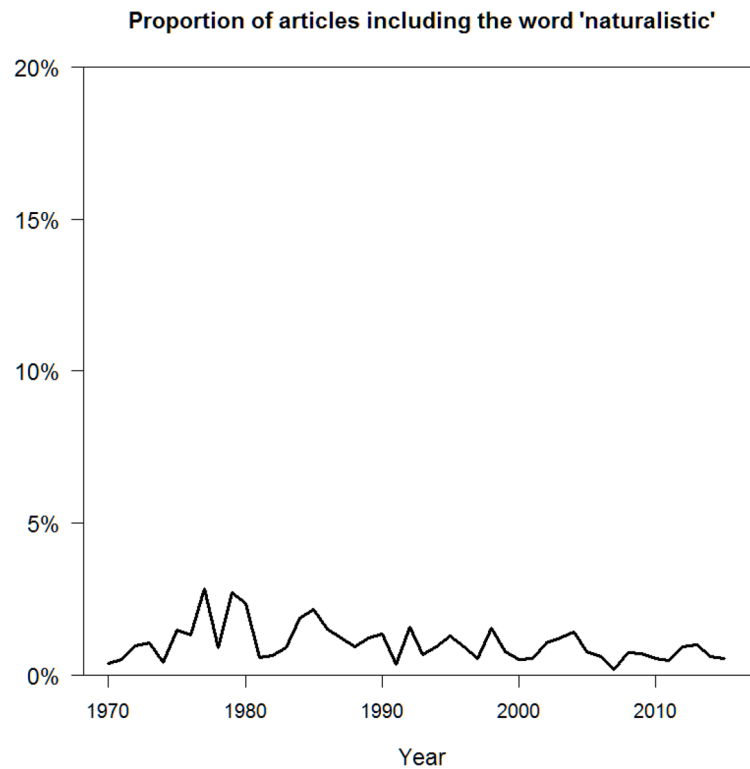


Figure 1.

Proportion of naturalistic articles from 1970 to the present.

Note: The line indicates the proportion of articles that contained the word *naturalistic* in the title, key words, or abstract as a function of year of publication (starting in 1970 or when journal articles were available for search in PsycInfo). This search may underestimate the number of articles on naturalistic research since some articles may have described naturalistic methods in different terms (e.g. as *unstructured observations*). The search included the following journals: *Developmental Science*, *Child Development*, *British Journal of Developmental Psychology*, *International Journal of Behavioral Development*, *Merrill-Palmer Quarterly*, and *Infant and Child Development* (17,884 articles total).

[PRODUCTION NOTE: In the line above the figure, please replace 'naturalistic' with *naturalistic*—so the quote marks are removed and the word is italicized.]