

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 thereby make assumptions and claims – here termed *ecological commitments* – about events outside research contexts. This article argues that (1) most developmental theories make ecological commitments about children's thoughts, actions, and experiences outside research contexts, (2) these commitments sometimes go unstated and untested, (3) naturalistic methods offer particularly promising ways of providing evidence for or against ecological commitments, and (4) naturalistic and experimental studies address unique, yet complementary questions. The article does not argue for increased ecological validity of experiments, nor for the abandonment of laboratory research, but proposes a reconsideration of the relations between developmental theories, naturalistic methods, and laboratory experiments.

Keywords: *naturalistic methods; experimental methods; developmental theory*

Ecological Commitments: Why Developmental Science Needs Naturalistic Methods

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 come to make moral judgments, or how children decide whom to befriend. In aiming to explain phenomena outside research contexts, developmental theories make what I will call *ecological commitments*: hypotheses, assumptions, and implications about what happens in children's lives outside research contexts.

This article argues that the ecological commitments of theories often go unstated and untested, and that naturalistic methods are uniquely suited to evaluate ecological commitments. This paper does not argue for an increase in the ecological validity of experiments, nor for the abandonment of the experimental method. Rather, the paper calls for a reconsideration of the relation between developmental theories, experiments, and naturalistic methods.

I will 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, finally, 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 (1) what children do, think, or experience and (2) how they come to have these characteristics. Since most of children's experiences, thoughts, and actions take

place outside research contexts, (1) and (2) will to a large extent refer to events taking place outside research contexts.

The aim of explaining phenomena outside research contexts is often stated most clearly in the opening and closing paragraphs of articles. In their groundbreaking paper on infants' preferences for helpful agents, Hamlin, Wynn, and Bloom (2007) 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 (2002) 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 help 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 non-research 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 above, developmental psychology is rife with ecological commitments: Basic developmental research often aims to explain everyday phenomena by claiming that phenomena outside research contexts resemble the phenomena studied in a laboratory study, while general statements of the type “children do/think/encounter X” entail commitments about what happens in children’s lives.

To start with a simplified, fictional example, imagine that a theorist proposed an explanation for why children’s understanding of others’ false beliefs seems to improve from 4 to 9 years of age (Wimmer & Perner, 1983). The proposed (fictional) explanation is that children come to 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 (1) children observe people looking for objects in the wrong location in everyday life and (2) 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 wrong object searches in everyday life or if most children at these ages typically show false belief understanding in everyday life regardless of whether they had observed any failed searches.

This fictional example includes two major categories of ecological commitments: (1) commitments about what children do (e.g. their thoughts, actions, or emotions) outside research contexts and (2) commitments about the distribution of children’s experiences (e.g. how often they observe certain events, if at all) prior to 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 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 chores in everyday life (Brownell, in press; Dahl, 2015b; Warneken & Tomasello, 2009), and whether infants use force mainly when provoked or whether they also hit or bite others without provocation (Bloom, 2013; Dahl, 2017; Hay, 2005). 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 (Mascolo & Fischer, 1995), or the causes of social conflicts (e.g. linguistic preferences, Spelke & Kinzler, 2007).

Ecological commitments about distributions of experiences. The second type of ecological commitment pertains to the distribution of children's experiences prior to 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 do 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 (see Spencer et al., 2009). 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 prior to the emergence of socio-moral evaluations (Hamlin & Wynn, 2011), helping behaviors (Warneken & Tomasello, 2009), object concepts (Aguiar & Baillargeon, 1999), and language skills (Marcus, 1993) (see also Marcus, 2001; Spelke & Kinzler, 2007).

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 it is often difficult to evaluate them. 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 (2009) argue that it can be challenging to determine what counts as relevant experiences. They cite the research by Bolhuis, Johnson, and Horn (1985) on chicks’ visual predisposition to approach objects that look like same-species individuals. Although this visual predisposition develops even in chicks reared in darkness, it is dependent on receiving one of several non-visual experiences such as running in a wheel (see also Campos et al., 2000). Such unexpected or “nonobvious” (Spencer et al., 2009, p. 79) connections between experiences and development make it all the more important to state ecological commitments explicitly in order to make theories empirically testable.

Ecological commitments are about what happens outside research contexts. Hence, no research method can reveal with absolute certainty whether ecological commitments are true. The mere experience of being observed by a researcher can influence thoughts and behaviors (Zegiob, Arnold, & Forehand, 1975). However, some research methods are better suited than

others to provide evidence for or against ecological commitments. Willems (1967) 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 response options). The less the researcher influences the context and the behavioral units of the participant, the closer the context will be to a non-research context. Methods low on both of Willems' dimensions, and thus maximally approximate non-research contexts, are typically referred to as *naturalistic* methods.² (Importantly, not all *observational* methods are naturalistic: In the common method of structured observations, the setting is constrained through standardization and may bear little resemblance to what children encounter in everyday life [Bronfenbrenner, 1977].)

Using naturalistic methods to test ecological commitments. Naturalistic methods are methods by which researchers study events that were not purposively influenced or constrained by the researcher. The canonical naturalistic method is naturalistic observation in which a trained researcher observes and describes events of interest in real time (e.g. Brownlee & Bakeman, 1981; Dunn, 1988; Dunn & Munn, 1985; Power & Parke, 1986). However, recent technological advances have expanded the range of naturalistic methods to include high-definition video recording of interactions (Dahl, 2015), audio recording of speech in everyday life (Oller et al., 2010), head-mounted cameras to track children's gaze during interactions (Fausey, Jayaraman, & Smith, 2016; Yurovsky, Smith, & Yu, 2013), robots testing models of natural social interaction (Perone & Spencer, 2013), and new methods for analyzing naturally occurring motor activity in infants (Cole, Robinson, & Adolph, 2016). Relatedly, new ways of storing and sharing videos,

such as the *Databrary* initiative, may allow researchers to test hypotheses using existing naturalistic data (Adolph, 2016).

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 (Falk & Heckman, 2009), although non-experimental data can also provide convincing evidence of causal relations (Rutter, Pickles, Murray, & Eaves, 2001). However, ecological commitments are not about what causes what, but about what happens outside research contexts. It may well be that certain changes in one (independent) variable 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 (McCall, 1977).

The use of naturalistic methods to test ecological commitments is rare, but examples exist, for instance in research on language development. Skinner (1957) 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 (1970) analysis of naturalistic parent-child speech, which suggested that explicit corrections of children's ungrammatical utterances are too rare to explain how children acquire grammar (see also Marcus, 1993).

Research on infant 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 that develops independently of everyday experiences with helping. For instance,

Warneken and Tomasello (2006) proposed that “infants 18 months of age are too young to have received much verbal encouragement for helping from parents” (p. 1302). Other theorists have emphasized that infant helping is scaffolded by parents in everyday life (Brownell, in press). To evaluate these contrasting ecological commitments, Dahl (2015b) videotaped naturally occurring home interactions in U.S. middle class families and found that most of the infants were encouraged to be help, consistent with the ecological commitments of the scaffolding view. Importantly, this naturalistic evidence does not show a causal relation between encouragement and infant helping (see below), but does raise the possibility that parental encouragement may contribute to the emergence of infant helping.

The shortage of naturalistic research. Several developmental researchers have called for more research on children’s everyday contexts (Bandura & Walters, 1963; Bronfenbrenner, 1986; McCall, 1977). One might therefore think that the evidence for evaluating most ecological commitments is already available. Indeed, Bronfenbrenner (1986) noted a general increase in the number of studies taking place in real-life settings between the mid-1970s and the mid-1980s. However, there are two reasons why we – like Bronfenbrenner himself – may not “rest content” (p. 289).

The first reason is that the increase in naturalistic research noted by Bronfenbrenner may not have been sustained. As a rough measure of the use of naturalistic methods, I calculated the proportion of articles in seven developmental journals containing the word “naturalistic” in the title, abstract, keywords, or other descriptors (Figure 1). The proportion of such articles increased up to the mid-1980s, consistent with Bronfenbrenner’s (1986) observation, followed by a subsequent decline. Over the past 10 years, only 0.7% (39 out of 5948) of the articles had the word “naturalistic” in their descriptors.

FIGURE 1

The second reason to remain “discontent” is that naturalistic research by itself does not guarantee testing of ecological commitments. It is quite possible to complete detailed descriptions of naturally occurring events that do not answer any theoretically interesting questions. For instance, if Brown and Hanlon (1970) had merely reported the number of times the letter “a” appeared in their transcripts, they would not have been testing any ecological commitments. Rather, such a study would represent what Bronfenbrenner (1986) called “context without development” (p. 288): description for the sake of description without regard for the testing or development of 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 limitations (Holmes & Teti, 2005; McCall, 1977; Willems, 1967). The virtues of randomized experiments for testing causal hypotheses are well known. Moreover, experimental and laboratory methods can often assess individual characteristics, for instance children’s cognitive abilities, with greater precision than naturalistic methods (Holmes & Teti, 2005). The complementary strengths and weaknesses of different methods can be exploited in a program of research. For instance, naturalistic methods can indicate whether two variables co-vary in everyday life, whereas the experimental method can indicate whether one variable causes changes in the other (Bandura & Walters, 1963). Following up on the naturalistic finding that parents encourage infant helping (Dahl, 2015b), an experimental study found that

encouragement and praise increased infant helping (Dahl et al., in press; see also Campos et al., 2000).

The complementary roles of naturalistic and experimental methods is rarely noted in contemporary developmental science. Textbooks often refer to experiments as the ideal method for testing causal hypotheses in basic developmental research (Lightfoot, Cole, & Cole, 2008) or as the “gold standard of psychological research” (Gonzalez, Yu, & Volling, 2012, p. 249). In contrast, the present paper has argued that there are some hypotheses (i.e. the ecological commitments of a theory) that 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 collection is sometimes false, while what seems obvious after data collection may not have seemed so obvious before data collection. And what is obvious to one person may not be obvious to another. This author may not be alone in having had the same set of naturalistic findings be described by two different reviewers as obviously true and obviously false. In empirical science, intuitions should normally take the back seat to data.

A second type of critique is that a given naturalistic study only investigates certain contexts or codes certain variables. For instance, a critic may argue that the findings from one cultural group may differ from the findings of 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 elicit such concerns from reviewers, the concerns apply equally to laboratory studies, which are typically limited to a single context and a small number of variables. Regardless of method, questions about generalizability and comprehensiveness provide reasons for conducting additional research and for being cautious when seeking to generalize from single studies. However, concerns with generalizability and comprehensiveness cannot count against the publication of naturalistic studies unless the scientific community is willing to apply similar requirements to laboratory experiments.

Conclusion

The present article has made the following arguments: (1) Most developmental theories make ecological commitments about children's thoughts, actions, and experiences outside research contexts; (2) These commitments sometimes go unstated, making them difficult to evaluate; (3) Naturalistic methods offer particularly promising ways of providing evidence for or against ecological commitments; and (4) Naturalistic and experimental research answer unique, yet complementary questions: When systematically combined, these different methods can yield important insights into how children develop. I have made these arguments while making minimal assumptions about the theoretical outlook of researchers. Theories that seek to explain developmental phenomena taking place 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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Footnotes

¹The notion of ecological commitments builds on Quine's (1948) concept of *ontological* ("existential") commitments, which refers to the kinds of entities that have to exist in the world in order for a theory or claim to be true. For instance, Quine (1948) argues that a person stating "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 in everyday life several times per week") or as distributions of variables ($h_{ij} \sim \text{Pois}[\lambda_i]$, where h_{ij} is the number of times child i helped on week j and $\text{probability}[\lambda_i \geq 2] = 90\%$). Although most of the research discussed in this paper involves quantification of independent and dependent variables, ecological commitments are also involved in qualitative research.

²Naturalistic methods serve a number of other roles in developmental science, for instance in the development of theories (see Rogoff & Angelillo, 2002), and naturalistic methods are not the *only* methods that can help researchers evaluate ecological commitments. However, due to space constraints, I here focus on the use of naturalistic methods to test ecological commitments.

Figure 1. Proportion of naturalistic articles. The line indicates the proportion of articles that contained the word “naturalistic” in the title, keywords, or abstract as a function of year of publication (starting in 1970, or when journal articles were available for search in PsycInfo). This search is likely to somewhat underestimate the number of articles reporting on naturalistic research, since some articles may have described naturalistic methods in different terms (e.g. “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* (17884 articles total).

