
William R. Penuel, University of Colorado, UCB 249, Boulder CO 80309, william.penuel@colorado.edu
John H. Falk, Lynn D. Dierking, Julie Haun-Frank, Oregon State University, 237 Weniger Hall, Corvallis, OR 97331 falkj@science.oregonstate.edu, dierkinl@science.oregonstate.edu, haunfraj@onid.orst.edu
Ben R. Kirshner, Adam J. York, University of Colorado, UCB 249, Boulder CO 80309 ben.kirshner@colorado.edu, adam.j.york@colorado.edu

Abstract: In this paper, we propose a practice-based theory and new methods for the study of interest development. The theory incorporates individual psychological perspectives, but it also theorizes the place-based nature of interest development and seeks to give an account of how persons and practices are mutually constituted. It also identifies roles researchers can play in diagnosing inequity and informing efforts to improve coordination and enactment of opportunities to generate and develop interest in particular content areas. We describe how the Synergies project, a longitudinal study of elementary-aged children’s changing science-related pursuits and interests in a single community, is a context for developing this theory.

Psychological theories frame the problem of interest development principally from an individual perspective. Hidi and Renninger’s (2006) four-phase model of interest development, for example, articulates a potential trajectory from situational interest in a topic toward a well-developed individual interest. They define the latter as “a relatively enduring predisposition to reengage with particular classes of content over time” (p. 115) that is accompanied by positive feelings toward engagement and supported by a strong knowledge base in the topic. Their own and others’ measures of interests, moreover, focus principally on individuals: they include self-report measures designed to locate students’ level of interest within the four-phase model (e.g., Linnenbrink-Garcia et al., 2010) and case studies that combine interviews with direct observations (e.g., Renninger & Hidi, 2002).

Though psychological theories tend to focus on individual experience, these theories do assign a prominent role for social processes and context in interest development. Psychologists who study interest note that at all phases, interest can be generated, supported, and sustained by others (Hulleman, Durik, Schweigart, & Harackiewicz, 2008; Renninger & Hidi, 2002). The nature, depth, and longevity of interest, psychologists have observed, depend in part on favorable environmental factors, including social support (Nolen, 2007). Adults—including teachers, parents, and unrelated adult guides—play an important role in supporting interest development by brokering access to opportunities to pursue interest and creating opportunities for rich social interaction around specific topics (Pressick-Kilborn & Walker, 2002). Peers and siblings also are significant in supporting interest development (Azmitia & Hesser, 1993).

What psychological theories tend to miss, however, is how individuals’ access to social supports for developing particular kinds of interest varies from place to place in ways that are consequential for, and constitutive of individuals’ developing interests. Interest develops within particular ecologies of support (Barron, 2006), and within what Azevedo (2011) calls “interest relationships” embedded in networks of practices. Within the institutionalized social practices of communities, Azevedo (2011) argues, individuals construct and pursue “lines of practice” in which their participation varies over time, and in which they participate with others to constitute these very practices. By foregrounding interest relationships within lines of practice, argues Azevedo (2011), the central problematic of research on interest development becomes to trace how the joint contributions of individuals and community practices within particular institutional contexts support persistent participation in electives (see also Pressick-Kilborn & Walker, 2002).

In this reformulation of interest development research, one important question becomes how peoples’ participation simultaneously reproduces and changes those lines of practice. When the focus is on schooling practices, changes to those practices may be barely visible, and the timescales of radical change are long (Lemke, 2000). But lines of practice in communities associated with out-of-school–time offerings, programs and services for youth and with voluntary activities, such as sports teams, may transform more frequently the opportunities they provide for interest development (e.g., Falk & Needham, 2011). For example, when science-related museum exhibitions or library programs change in a community, they may introduce new topics and opportunities for families to engage with science, which may or may not develop into more enduring interests. As young people “vote with their feet” by choosing to engage in some activities and not others, they shape what happens within particular settings for learning (McLaughlin, Irby, & Langman, 1994). Young people involved in the arts and media production, for example, shape activity by their choices of performance and production topics. Even in places where youth have less formal authority to alter lines of practice, the constitution of the practice is still a joint accomplishment with those who design and lead activities (O’Connor & Allen, 2010).
This paper addresses the question of how we can theorize the simultaneous development of interest and practices and study it systematically. We offer as a guiding theoretical framework Packer’s (2010a) proposal for learning research as a “reflexive science of constitution” that enjoins researchers to take a critical stance of tracing the production of social orders and identities of orderers, as well as an emancipatory stance of seeking to inform concerted, collective efforts to transform practices in ways that expand human freedom. In order to show how such efforts play out in particular places, we describe two approaches we are employing in a study focused on science interest, the Synergies Project.

**Theorizing Interest within a Reflexive Science of Constitution**

Sociocultural theories of learning (e.g., Rogoff, 1995) and accounts of the microfoundations of institutions (e.g., Powell & Colyvas, 2007) both construe the development of persons and practices as mutually constitutive. That is to say, the forms of life in which we participate “make” us into certain kinds of people, by the tools and identities that practices make available for us to take up, and we “make” these practices by taking up, resisting, and adapting identities and tools that are available to them. Neither practices nor persons can be reduced to one another; nor can practices be viewed as “factors” that shape individual development. Rather, there is a “productive tension” (Wertsch & Penuel, 1996) between person and practice, one best characterized by viewing them as mutually constitutive. Packer (2010a) identifies three interrelated tasks of an educational researcher seeking to analyze the mutual constitution of persons and practices in a particular place: 1) Describing the order of a form of life; 2) Tracing the work of ordering by which that order is produced and reproduced, and 3) Interpreting the formation of orderers, that is, the identities of participants who carry out the work of ordering.

**Describing the Order of a Form of Life**

The order of a form of life includes the network of practices, tools, and people that relate to the focal phenomenon, which in our case is the development of interest. In sociocultural studies of the pursuit of hobbies and interests (Azevedo, 2011), this description has taken the form of describing the network of activities and cultural tools that make up communities of practice. These descriptions attempt to characterize the order at a particular juncture in history and time, “as if” that order is relatively stable, much in the way that Lave & Wenger (1991) represented the communities of practice in their seminal monograph.

**Tracing the Work of Ordering**

But tracing the work of ordering is a process by which the researcher seeks to explain how this order came to be, as well as how it is changing as people engage in that work. It considers communities of practice not as a container of qualities, but rather as dynamic intersections of people, tools, and activities that can be characterized in terms of flows, networks, and trajectories (Latour, 2005; Leander, Phillips, & Taylor, 2010; Packer, 2010b). An account of interest development, in this context, must take into account the ways that sponsors (Brandt, 1998) of interest development help young people deepen their interest by making it possible for them to move into new settings and help them navigate (Stevens, O'Connor, Garrison, Jocuns, & Amos, 2008) across institutional boundaries. It focuses also on how adults draw on their own networks to broker access (Barron, Martin, Takeuchi, & Fithian, 2009) for young people to adults who may be of assistance in pursuing an emerging interest. And it focuses on how interest develops over time, and across settings, as a function of prolepsis (Cole, 1996), that is, others’ projections of possible trajectories on young people, and as a function of persistence in participation in lines of practice (Azevedo, 2011).

**Interpreting the Formation of Orderers**

Interpreting the formation of orderers entails describing in detail the work of persons to construct motivations for their pursuits of particular lines of practice, that is, to develop “individual interests” in Hidi and Renninger’s (2006) formulation. This analysis of the production of orderers is likely similar to their case analyses (Renninger & Hidi, 2002) in that it highlights salient dimensions of individual development. However, Azevedo’s (2011) case study of David, a young person who developed and pursued a long-term interest in model rocketry, offers a better example, in that the case analysis focuses on the constraints and affordances of practices, and how individuals develop interests within the conditions of practice of a particular time and place. Individuals’ pursuit of these interests—through the appropriation of various tools or “techniques of the self” (Laidlaw, 2002)—make them into particular kinds of “orderers.” Their contributions to practices, in turn, partly reproduce and also partly change the practices themselves, by the ways that they appropriate or make into their own the tools available to participants (de Certeau, 2002).

**Realizing Critical Reflexivity**

According to Packer, a science of constitution becomes critical when it takes as its primary interest the expansion of human freedom and diagnoses inequity within its account of mutual constitution. Being a critical researcher, however, of forms of life in which one is not a regular participant, is not straightforward.
Fieldworkers must continually negotiate access to practices (Harrington, 2003), establishing an “acceptable identity within the terms of the form of life” in which contact with participants “enhances [their] identities” (Packer, 2010a, p. 24). Navigating and giving an account of the practices of a community, moreover, requires a critical stance towards one’s own theories and practices. That includes representing these theories and practices to others, partly as a form of member checking, but also to subject them to critique and challenge by participants. At the same time, this expression of reflexivity is intended to provide insight that is of use to participants in a particular form of life in the expansion of their own possibilities for action (Habermas, 1990).

Expanding Possibilities for Interest Development in a Community in The Synergies Project

The aim of the Synergies Project is to develop an innovative approach for empowering communities to envision and create a better, more effective community-wide STEM education system. The project, initiated by researchers and funded by the Noyce Foundation, is a collaborative effort among youth, adult community members, and representatives of institutions from a community that is focused on analyzing and improving STEM learning opportunities. The premise of the project is that if we can more fully understand how and why people—in particular early adolescent children within a poor, underserved community—develop (or lose) STEM-related interests, it would be possible to create a more synergistic and effective STEM education system; a system that more successfully supported STEM learning for all.

The approach we (the researchers) are employing is to study STEM interest development ecologically in everyday life and across multiple settings while also actively involving members of the community in a collective effort to enhance children’s STEM interest and engagement. In the project, we are employing two participatory research strategies that will enable us to explore and elaborate upon Packer’s (2010) outlines for a reflexive science of constitution. The first of the strategies is to engage adolescents as key informants and co-researchers with us in the task of addressing the question, “When and where are science?” (McDermott & Webber, 1998). The second is a community-centered participatory process of generating a theory of change that incorporates preliminary agent-based models as tools for interpreting the complex ways that interest develops across settings and times, and that seeks to answer the question, “How does a community organize practices to form identities of youth who vary in their interest in science?”

Strategy 1: Youth Participatory Action Research

One strategy we are using within Synergies is to engage adolescents in the neighborhood early on as key informants and as co-researchers. Youth themselves have been shown to be effective informants and co-researchers in collaborative community change initiatives (Kirshner, O'Donoghue, & McLaughlin, 2005). A particularly useful approach is to engage them in ethnographic research, in which they learn to document cultural and community practices through multiple media: writing, photography, interviews, and so on. By so doing, as outsiders to this neighborhood, we as researchers can craft identities for ourselves that are acceptable to participants as providers of an OST enrichment program that is teaching valued skills and providing meaningful experiences to youth in the community.

By organizing the activities around the task of describing the organization of practices in which science interests might be generated and cultivated, we also sought to gain insight into the social orders and work of ordering within the neighborhood. Young people traverse multiple spaces—on foot, by car, and by bus—that allow them access to selected places and experiences. As part of the program activities, they have developed accounts of how lines of practice can emerge within particular settings, with whom, and with what support from adults and peers. In addition, a key idea of this aspect of the project is to broaden participants’ and our own conceptions of “When and where is science?” Several of the activities explicitly encourage youth researchers in the project to find science in everyday activities, even activities where the aim might not be science learning. Our goal is to enlist these youth as allies in identifying a broad range of activities within different settings where there are opportunities to develop interest in science. Over time, we imagine young people’s roles to transform into more activist roles within the project by serving as community ambassadors and guides for us and contribute to strategies that the community develops to improve coordination of learning opportunities.

Strategy 2: Participatory Modeling of a Theory of Change

It is typical at the outset of community-based initiatives to engage stakeholders from different institutions and interest groups in a process of articulating a theory of change (Connell & Kubisch, 1999). However, many of the representations of community theories of change may represent “context” in ways that do not reflect the ways that practices and persons are mutually constitutive. They fail, for example, to capture feedback loops within social systems, which can incline persons and practices under different conditions to develop along divergent trajectories (Fraser, Rademacher, & Sweeney, 2005). Complexity theory provides a framework in which the relationships between constructs at different levels can enables insights into the system’s structure about how it operates and evolves (Gell-Mann, 2003). Agent-based modeling (ABM) tools are software programs that can
help to make mechanisms such as the kinds of dynamics that characterize complex systems (e.g., feedback loops) visible and thus more accessible (Wilensky & Reisman, 2006). Moreover, such tools also are potentially powerful tools for investigating alternate theories of learning and development, including the outcomes of designed learning environments (Blikstein, Abrahamson, & Wilensky, 2007).

In the Synergies project, we are using these agent-based models to facilitate a process with the community of making visible the mechanisms and processes by which different stakeholders believe interest-developing opportunities are coordinated within the neighborhood. We will also use it as a way to foster reflexivity within our team by rendering visible some of the processes that social science theory posits are critical for interest development. We are still working out the precise details of how these tools might function in real-time, as part of a fast-paced meeting of stakeholders, but we are hopeful that these tools will be able to render and make useful for purposes of community organizing the conditions for learning, including inequities that lead some young people to develop a strong interest in science and others to become turned off.

How These Synergies Activities Inform Concerted Efforts to Expand Understanding of How to Promote Interest Development in the Community

The two strategies described above will inform two other strategies of the project that are designed to contribute to our collective knowledge of how to promote interest development and build community capacity. First, we plan to use both youths’ digital stories and the community modeling to inform the design of a longitudinal study of children’s changing participation in lines of practice and their interest development. This multi-method study will include surveys of all fifth-graders living in the community (including those attending public schools, private and parochial schools, and those who are home-schooled), in-depth interviews and collection of artifacts with children and their family members of a focused sample of 50 families, and longitudinal analyses of changes over time in outcomes, patterns of participation, and children’s social networks. At the conclusion of these analyses, we will work with community members to collaboratively design a series of educational interventions with our STEM partners (in school and out) that can then be implemented with additional funds raised prior to Years 3 & 4 and assessed using the ABM and on the ground data collection.

We are at the beginning of this particular study, but its design illustrates a way that we can theorize and study interest development in a manner that contrasts sharply with past efforts, which largely develop accounts of interest development that focus on individual psychological processes and social dynamics, without attending to the structure of opportunities in particular places. By asking the questions, “When and where are science?” and “How does a community organize practices to form identities of youth who vary in their interest in science?” we aim to move theorizing about interest beyond simple apprenticeship models that presume stable practices and to foreground concerted, collective efforts to improve coordination of opportunities to learn.

References


