CHAPTER 1

Introduction
Locating Concept Formation in the Wild

It is commonly accepted that concepts are among the basic building blocks of human cognition, knowledge, and learning (e.g., Keil, 1992; Lamberts & Shanks, 1997; Margolis & Laurence, 1999; Murphy, 2002). What is not so often realized in cognitive science and educational research is that coping with the world requires that we operate with increasingly complex and demanding concepts. Terms like terrorism, climate change, pandemic, globalization, or human genome are not merely words. They are names for multifaceted and ill-bounded – sometimes monstrous – objects, ideas, and practices, which human beings and their institutions desperately try to understand and manage, or *conceptualize*.

It is not an accident that in many languages the word "concept" (e.g., in German "Begriff") is derived from the word "to grasp," literally to take or grab with one's hand. It is equally interesting that the English word concept is related to "conceiving," that is, imagining, envisioning, or making up a possible future state of affairs.[1] These two roots indicate the dual meaning of concepts: they are practical instruments for handling and mastering objects, and they are also future-oriented visions or ways of worldmaking (Goodman, 1978).[2]

[1] The *Online Etymology Dictionary* [www.etymonline.com/word/concept] describes the origins of the notion of "concept" as follows: "From Medieval Latin *conceptum* 'draft, abstract,' in classical Latin '(a thing) conceived,' from *concep-*, past-participle stem of *concipere* 'to take in and hold; become pregnant' from *con-*, here probably an intensive prefix (see **con-**), + combining form of *capere* 'to take,' from PIE root ***kap-** 'to grasp'."

[2] The notion of "concept" also plays a central role in practices and methodologies of product development and design (e.g., Fogg, 2003). The term "concept car," for example, denotes a future-oriented model of a "dream car" that plays at the boundaries of what might be possible (Bell, 2003). More generally, concepts in design are commonly understood as first drafts or sketches of the essential contours of an emerging product.

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1.1 Sources of Inspiration and Insight

This book is a product of a long journey in the world of concept formation. The journey started in the late 1970s when I first encountered the work of Vasily Vasil'evitch Davydov. Until then, I had the uneasy and exciting feeling that concepts are important for our lives and practical activities – but the dominant literature did not match this sense of importance. It depicted concepts mainly as static labels with which people supposedly define and classify things and phenomena. Not an exciting perspective.

I got hold of Davydov's main work, *Types of Generalization in Instruction* (1990), in 1977, soon after its German translation was published in what used to be the German Democratic Republic. Davydov argued that we need to distinguish between what he called *empirical concepts* and *theoretical concepts*. The former do indeed define and classify things. In Davydov's dialectical framework, theoretical concepts grasp the origin and development of complex phenomena. They do not aim at fixing static categories but at opening up and tracing the inner relations, historical movement, and future potentials of objects and phenomena. Empirical concepts generate stabilization knowledge; theoretical concepts generate possibility knowledge (Engeström, 2007a, 2023).

An important support and extension to Davydov's dialectics came from reading Toulmin's (1972) *Human Understanding,* incidentally published the same year as Davydov's book in its original Russian version. Toulmin's radical contribution can be read in the subtitle of his book: *The Collective Use and Evolution of Concepts.* Toulmin saw concepts squarely in their collective, historical, and cultural existence, not merely as individual psychological formations. It is also fitting that it was Toulmin (1999) who, in his Tanner lecture, coined "the idol of stability" as the plague that strips social and human sciences of much of their potential for changing the world. Subsequently, the work of another philosopher, Jensen (1983), on concepts of illness, reinforced the insight into the collective and dynamically evolving nature of concepts.

Neither Davydov nor Toulmin ventured into concept formation in the messy worlds of everyday life and work outside school instruction and science. To take this step, encouragement came from the work of Geof Bowker, Aaron Cicourel, Michael Cole, Chuck and Candy Goodwin, Jim Greeno, Ed Hutchins, Jean Lave, Bud Mehan, Susan Leigh Star, Lucy Suchman, and several others, mainly located in the west coast of the United States. These colleagues and friends pioneered the ideas of

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culturally situated and distributed cognition and cooperative action in the late 1980s and 1990s. With the notable exception of Greeno and Hutchins, they did not specifically write about concepts. They pursued a broader paradigm shift in the spirit of Gilbert Ryle's dictum:

> The statement "the mind is its own place," as theorists might construe it, is not true, for the mind is not even a metaphorical "place." On the contrary, the chessboard, the platform, the scholar's desk, the judge's bench, the lorry-driver's seat, the studio and the football field are among its places. These are where people work and play stupidly or intelligently. (Ryle, 1949, p. 51)

So the three initial sources of the journey that led to this book are a Marxist dialectical theory of concepts, an emphasis on the collective and historically evolving nature of concepts, and the turn toward everyday practical activities as legitimate arenas of thinking and conceptualizing. The resources for integrating these sources into a coherent framework come from cultural-historical activity theory (CHAT) and the theory of expansive learning (Engeström, 1987, 2015). Since the early 1980s, I have applied and developed this theoretical framework in interventionist studies of various types of work and organizations, from cleaning services to hospitals and courts of law to factories and banks (Engeström & Middleton, 1996; Engeström, 2005a, 2008a, 2016, 2018). Time and again, those studies led me to the challenge of concept formation in the wild. Those studies generated rich empirical material on concept formation in work and organizations. In recent years, this empirical basis has been broadened to include social movements (Engeström, Brunila, & Rantavuori, 2023) and societal change efforts championed by broad-based coalitions (Engeström & Sannino, 2021; Sannino, Engeström, & Jokinen, 2021).

1.2 Putting Concept Formation in the Wild on the Map

In mainstream studies of concept formation and conceptual change, the focus is usually on well-defined and stable concepts of natural sciences and mathematics. This is the domain of "formal concepts," as Greeno (2012) called them. On the other hand, news media, political debates, and problem-solving in work activities are saturated with different concepts. Again following Greeno (2012), we may call them "functional concepts." These concepts are inherently polyvalent, debated, incomplete, and often "loose" (Löwy, 1992). They commonly cut across disciplinary boundaries.

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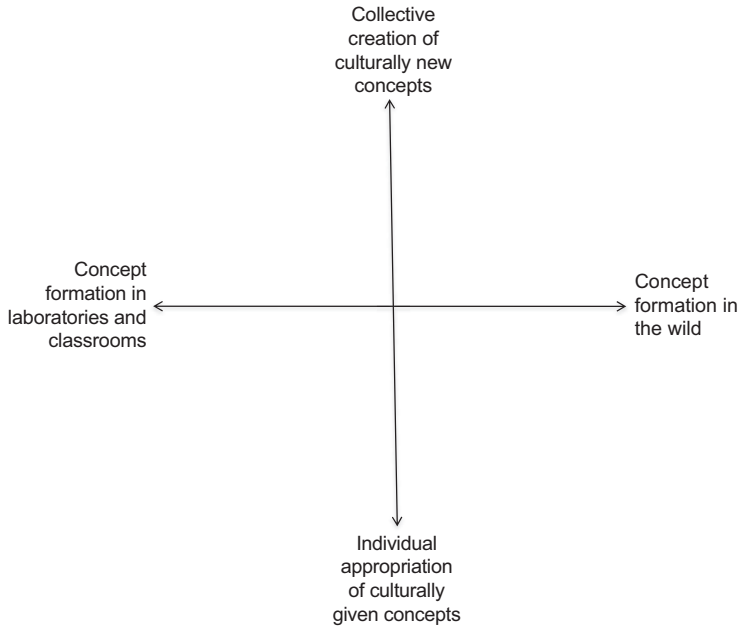


Figure 1.1 Dimensions of concept formation.

Different stakeholders produce partial versions of such concepts. Thus, the formation and change of functional concepts involve confrontation and contestation as well as negotiation and blending. Functional concepts are loaded with affects, hopes, fears, values, and collective intentions.

Although useful, the distinction between functional and formal concepts is also risky. It may be misinterpreted as implying a hierarchy – formal concepts being somehow higher and more advanced than functional ones. No such simple hierarchy is valid. Formal concepts are functional for culturally and historically very specific activities and epistemologies. Functional concepts encompass a huge variety of activities and epistemologies. The challenge is to start digging into and making sense of this variety.

To locate the focus of this book beyond the dichotomy of functional *vs.* formal, we might employ the two dimensions shown in Figure 1.1 as a mapping device.

The horizontal dimension in Figure 1.1 represents movement between concept formation in the relatively well-controlled contexts of laboratory experiments and formal instruction on the one hand, and concept

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formation in the less enclosed and controlled activities and settings of the wider society on the other hand. The vertical dimension represents movement between individual appropriation of culturally established concepts on the one hand and collective construction of culturally novel concepts on the other hand.

Making use of these two dimensions, Figure 1.1 displays four fields of concept formation. The lower left-hand field represents what commonly takes place in experiments on concept formation and in school and university classrooms: individual appropriation of culturally well-established concepts, often characterized as shifting from naïve prescientific conceptions to truly scientific concepts (e.g., Vosniadou, 2007). The lower right-hand field represents individual acquisition of culturally given concepts in the wild – processes we might characterize as everyday cognition (Rogoff & Lave, 1984), situated cognition (Robbins & Aydede, 2008), or conceptual socialization into established practices, activities, and institutions. The upper left-hand field represents collective construction of culturally novel concepts in laboratory-like settings, such as the bioengineering laboratories observed and analyzed by Nersessian (2012), including more generally the relatively protected chambers of scientists and philosophers (Toulmin, 1972).

The primary focus of this book is on the upper right-hand field of Figure 1.1: *collective creation of culturally new concepts in the wild.* The starting point is the realization that culturally novel concepts are created not only by scientists but also by people struggling with persistent problems and challenges in all walks of life. We are all involved in the creation of new concepts. This field has been largely omitted by scholars of concept formation. Taking this field seriously means that we need to reexamine and perhaps revamp aspects of our basic understanding of concepts.

Collective creation of culturally new concepts in the wild cannot be expected to occur in a pure form. There is constant movement and blending between the four fields of Figure 1.1. The collective creation of a novel concept within a professional work activity, for example, quite inevitably also engenders and becomes intertwined with processes of individual appropriation and instruction.

In the introduction to his book *Cognition in the Wild,* Ed Hutchins (1995) explained the meaning of his title as follows.

> The phrase "cognition in the wild" refers to human cognition in its natural habitat – that is, to naturally occurring culturally constituted human activity. I do not intend "cognition in the wild" to be read as similar to

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> Lévi-Strauss's "pensée sauvage," nor do I intend it to contrast with Jack Goody's (1977) notion of domesticated mind. Instead, I have in mind the distinction between the laboratory, where cognition is studied in captivity, and the everyday world, where human cognition adapts to its natural surroundings. I hope to evoke with this metaphor a sense of ecology of thinking in which human cognition interacts with an environment rich in organizing resources. (pp. xiii–xiv)

Hutchins pointed out that in the laboratory, cognition is studied in captivity. This may evoke the illusionary expectation that there is a wilderness out there in which human cognition is free of constraints. It is more appropriate to acknowledge that human beings always operate in various degrees and forms of captivity, within institutions, organizations, and activities that have their own rules, boundaries, and limitations. So "in the wild" does not mean "free of constraints." For me, "in the wild" refers to the fact that the constraints are never complete. In other words, human action and cognition are never fully predictable or programmable.

1.3 The Structure of the Book

In Chapter 2, I will present a set of recent cognitive and social-psychological theories that offer important initial lessons for the perspective developed in this book. Chapter 3 examines CHAT and its dialectical approach to concept formation, leading to the identification of guiding ideas for the study of concept formation in the wild.

In Chapter 4 of the book, I will examine concept formation across different productive activities, ranging from the building of large wooden fishing boats to the construction of an integrated pest management system among horticultural producers, and to the formation of the concept of knotworking in an academic library. The chapter yields a typology of functional concepts, consisting of prototype concepts, classification concepts, process concepts, systems concepts, and germ cell concepts. Each type of concept has its own characteristic potentials and limitations. Concepts are seen as embedded in complex instrumentalities, social relationships, and patterns of learning within the activity systems that generate and employ them.

In Chapter 5, the process of ascending from the abstract to the concrete is analyzed in detail. The chapter examines the steps of formation of the concept of sustainable physical mobility in home care for the elderly. The bodily action of standing up from a chair is identified as the germ cell of

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sustainable mobility for frail elderly home care clients. The internally contradictory germ cell is modeled, and a client's stepwise ascending to the concrete is traced by identifying richly diverse trails of actions of mobility that emerged from systematic implementation of the germ cell.

Chapter 6 analyzes the interplay of concept formation and double stimulation, using video-recorded home care visits as data. The analysis yields a model of critical encounters in which artifacts are used to enhance steps toward a new concept and as second stimuli of agentive actions.

Chapter 7 offers a complementary lens for the analysis and understanding of processes of concept formation in the wild. The lens is that of tracing the formation of concepts as movement in a space defined by two dimensions, namely the dimension of the degree of stabilization and the dimension of representational modality. The chapter reexamines cases presented in Chapters 3, 4, and 5: the formation of the concept of expansive degrowth in a food cooperative, the concept of knotworking in an academic library, and the formation of the concept of sustainable physical mobility in home care for the elderly.

In Chapter 8, the evolution of the concept of Housing First is analyzed. This concept has become a germ cell for various powerful programs of reducing and eradicating homelessness. The concept is also contested, as different implementations of it challenge one another. The chapter traces the evolution of this concept from the 1990s to current steps taken in Finland to construct Housing First 2.0 as a new phase in the evolution of the concept.

Chapter 9 draws together the findings and insights gained in the book. It proposes a new agenda for studies of concept formation. This new agenda prioritizes formative interventions that support collective creation of novel germ cell concepts in activities facing fateful challenges and critical transformations. This agenda is an important component of the emerging fourth generation of CHAT.

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