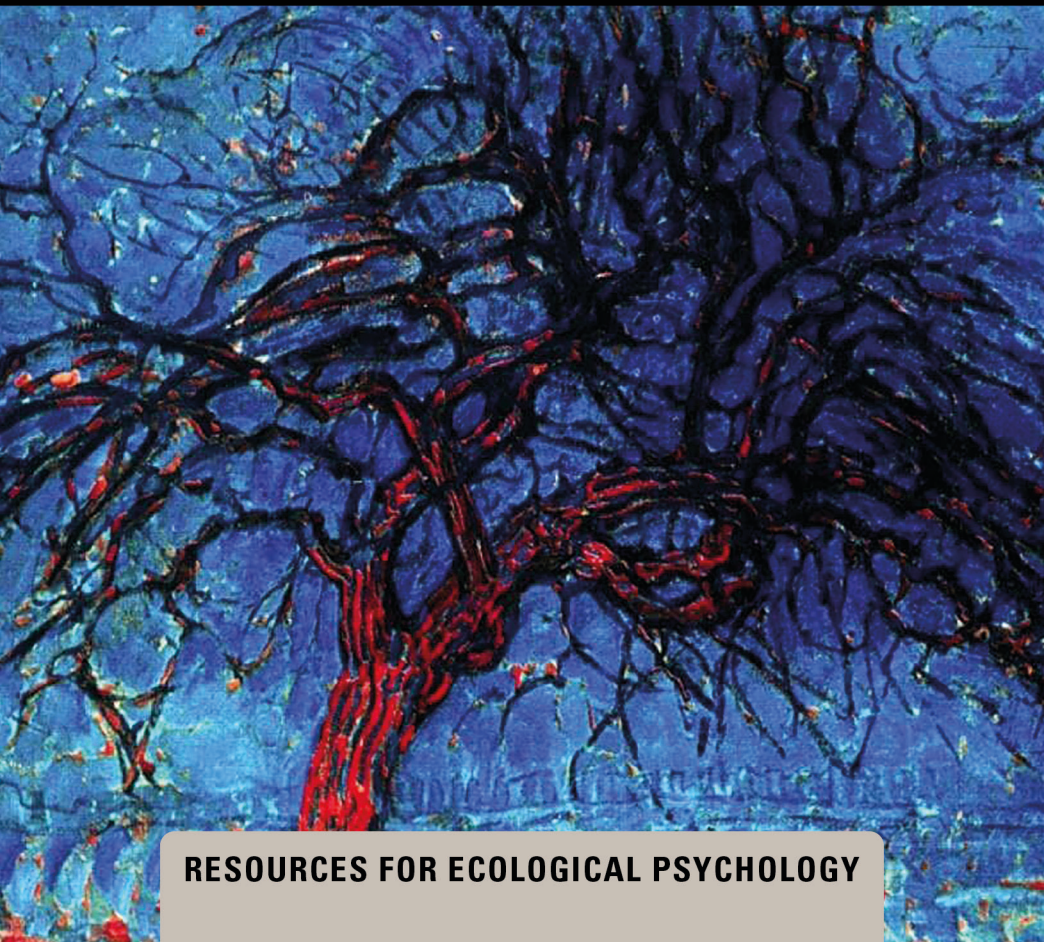
Rob Withagen

ROUTLEDGE

Affective Gibsonian Psychology



RESOURCES FOR ECOLOGICAL PSYCHOLOGY

AFFECTIVE GIBSONIAN PSYCHOLOGY

Affective Gibsonian Psychology presents the first comprehensive ecological approach to our affective engagement with the environment, drawing on James Gibson's new foundation of psychology.

This book develops a unique theoretical framework, beginning with Gibson's ecological approach, but also drawing on phenomenology, developmental systems theory, and the pioneering ideas of the psychoanalyst Alice Miller. The advanced perspective allows us to understand our emotional engagement with the environment, and the individual differences therein, without returning to the Cartesian assumptions that have plagued psychology since the 17th century.

This book is intended to contribute to the ecological movement in psychology and is of interest to scholars working in the fields of Gibsonian psychology, affective science, phenomenology, clinical psychology, and (radical) embodied cognitive science.

Rob Withagen is a Theoretical Psychologist and works as an Assistant Professor at the Department of Human Movement Sciences of the University Medical Center Groningen and the University of Groningen, the Netherlands.

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AFFECTIVE GIBSONIAN PSYCHOLOGY

Rob Withagen

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In loving memory of my father,
for Suus

CONTENTS

ACKNOWLEDGMENTS

The seed of this book was planted almost 15 years ago. I went through a difficult time—all of a sudden I suffered from panic attacks without understanding their origin. It took me some years to recover from this, and during this period my beloved aunt Francis Niesten mentioned the work of Alice Miller to me. Miller's books definitely struck a resonant chord—they showed me how important developmental history is for our adult emotional life. The more I read her books, and the more I observed the behavior of friends, family, colleagues, and myself, the more I realized that Miller was right about the human condition. However, this insight also resulted in cognitive dissonance. I was (and still am) a trained Gibsonian ecological psychologist who truly believes that, generally speaking, psychology is on the wrong course and should change direction. Instead of examining 'mental processes in the head', psychology should take the animal–environment relation as the focus of study. Alice Miller, however, was a trained psychoanalyst, and although she forcefully rejected some of the pioneering ideas of Freud, she retained working within his representationalist framework. Among other things, she still assumed that we have repressed memories that are stored in our unconsciousness and determine our behavior. And any representational way of thinking is at variance with the Gibsonian tradition I was working in. However, after reading

Miller's work, I realized how little ecological psychologists had to say about our emotional lives. In addition, I started to take developmental history more seriously and made some room for it in the ecological framework I was advancing. Yet serious work was needed to reconcile the two perspectives. How to develop a Gibsonian approach to our emotional engagement with the environment that incorporates the important insights of Miller without giving up on its fundamental principles? I soon realized that writing a couple of papers would not suffice. Minimally a booklet is needed. And here it is.

Although the writing of this monograph was mainly a solitary event, I had the luck to be surrounded by some wonderful people. I would like to thank the people at the Department of Human Movement Sciences of the University Medical Center Groningen and the University of Groningen. I have been working there for more than 15 years now and am still enjoying it, not in the least because of the nice colleagues and students, and the fun we often have. Thanks also to the librarian Eddy Kielema for always succeeding in finding some obscure article or chapter that I needed for this book.

During my academic career I met several other interesting people who were important for the development of my thinking. I would like to thank in particular Duarte Araújo, Sacha Bem, Jelle Bruineberg, Tony Chemero, Matthieu de Wit, Matt Dicks, Jos Houtenbos, Fred Keijzer, Julian Kiverstein, Claire Michaels, Theo Mulder, Erik Myin, Erik Rietveld, John van der Kamp, and Ludger van Dijk. I owe special thanks to Alan Costall and Harry Heft for all the wonderful discussions over the last 20 years. Alan also gave me some great advice and feedback during the various stages of writing this book. It is always a pleasure to visit him and Ann in Portsmouth and go home with an extensive required reading list. Jelle Bruineberg, Laura Cuijpers, Matthieu de Wit, Ludger van Dijk, and Lisa van Dolder are gratefully acknowledged for very useful comments on earlier versions of (parts of) the book. Thanks to Sanneke de Haan for providing me with her figures of the fields of affordances. And it was a pleasure to work with Ceri McLardy and Saloni Singhania, my editors at Routledge, and Jeffrey Wagman and Julia Blau, the series editors of the Resources for Ecological Psychology.

Although academic work is an important part of my life, there are of course many other things that also make life worth living. I am

happy to have such a loving and supportive family and a couple of good friends. Naturally, Suzanne Nooij, my wife, is dearest to me. I feel privileged to share my life with hers.

Rob Withagen
Amersfoort, Fall 2021

INTRODUCTION

The American psychologist James J. Gibson is mainly known as a theorist of perception. This is of no surprise—his many articles, book chapters, and three books specifically address problems in perception, with a special attention to the visual domain. Yet in developing his ecological approach to perception, Gibson actually formulated a new foundation for psychology, one that broke with the mechanistic assumptions that have plagued the discipline since the 17th century. Indeed, rather than taking animals to be passive machines that have to be put into motion (as Descartes had surmised), Gibson argued that animals are inherently active organisms that develop over time. Moreover, he replaced the notion of the environment as meaningless matter in motion (introduced by the likes of Galileo) with the conception of a meaningful environment filled with what he called *affordances*—opportunities for action. And in contrast to the still dominant Cartesian idea that animals are deprived of a direct perceptual contact with the environment, Gibson stated that animals are in direct perceptual touch with it.

As Gibson himself stressed in several of his writings, these new ecological ideas on animals, perception, and the environment pave the way for a new psychology. They require us to rethink many theories in psychology, including those on memory, cognition, imagination, hallucination, and social processes. In fact, Gibson's perspective suggests that

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the vast majority of theories in psychology are based on the wrong assumptions. As Gibson (1967/2020, p. 21) put it in his autobiography:

> [The] 20,000 psychologists in this country alone […] seem to feel, many of them, that all we need to do is to consolidate our scientific gains. Their self-confidence astonishes me. For these gains seem to me puny, and scientific psychology seems to me ill-founded. At any time the whole psychological applecart might be upset. Let them be aware!

And in the final years of his life, when his theory of direct perception was relatively matured, Gibson already hinted at some significant implications of his ecological perspective for the whole of psychology.

In the two decades that followed Gibson's death (in 1979), several authors have aimed at furthering his approach. However, they did do so in different ways, focusing on different parts of Gibson's writings, and taking inspiration from different fields of science. Turvey (1990, 1992), for example, was inspired mainly by physics and aimed to develop Gibson's framework into a "physical psychology", one that tries to discover laws that govern perception–action, akin to the laws of physics. Costall (1995) and Heft (1989, 2001), on the other hand, placed the sociocultural environment that we inevitably create and act in at the heart of their ecological accounts. And Reed's (1996a, 1996b) ecological approach was deeply rooted in Darwinian thinking. Especially in his book *Encountering the world*, Reed (1996a) presented the outlines of a broad ecological perspective that was based on Gibson's concepts and ideas and dealt with phenomena like (brain)development, language, motivation, perception, action, cognition, and the social.

In more recent years, several other authors took this project further and developed more detailed ecological accounts of tool use (e.g., Bongers, Smitsman, & Michaels, 2003; Bril, Rein, Nonaka, Wenban-Smith, & Dietrich, 2010; Wagman, Caputo, & Stoffregen, 2016), development (e.g., Szokolszky & Read, 2018), cultural differences (e.g., Ingold, 2000), the design process of architects (Rietveld & Brouwers, 2017; Van Dijk & Rietveld, 2021), and language (e.g., Baggs, 2015; Hodges & Fowler, 2015; Raczaszek-Leonardi, Nomikou, Rohlfing, & Deacon, 2018; Van Den Herik, 2019; Van Dijk, 2016a), showing the scope and power of an ecological turn in psychology.

This book intends to contribute to this wave of theorizing. Specifically, I aim at developing an affective Gibsonian psychology,

that is, an ecological account that centralizes our affective engagement with the world. We, and other animals, are not simply in the world, but always relate to it—things matter to us (e.g., Colombetti, 2014; Dreyfus, 1991; Dreyfus & Kelly, 2007). We find a house pleasant, a baby adorable, certain food to be tasteful, a painting beautiful, frightening, or enchanting, we strive to achieve certain relationships with our partner, friends, and family, and so on. There is always an affective component to perception, action, cognition, and any other psychological process—there is no neutral kind.

This phenomenological insight that affectivity permeates our being has not been central in Gibson's work. Discussions of affectivity and emotions are hard to find in his writings, especially in the later ones in which his landmark ideas are introduced. Moreover, and as we will see in more detail in Chapter 3, although Gibson recognized needs, motives, and emotions, he sidelined them when working on his theories of perception and the environment, as if they hindered the development of a genuine *ecological* approach. Also the vast majority of Neo-Gibsonians barely mentioned, let alone theorized about, emotions and affect. Especially for an approach that takes everyday experience and behavior seriously this is quite remarkable. After all, emotions play such vital roles in all of our lives—"[t]hey are what we live for, and what we live to avoid" (Prinz, 2004, p. vii). Hence, to develop the Gibsonian approach into a genuine psychology, affectivity needs to be centralized. In the chapters that follow, I will lay out a comprehensive ecological account that does so. Here is the plan.

Outline of the book

Chapter 1 is about the mechanistic foundation of psychology. In my view, one can only appreciate the significance and elegance of Gibson's approach if one understands the traditional framework at which he took aim. After a brief sketch of the mechanization of the inanimate world, I will discuss the work of Descartes and some of his followers. We will see that they applied the mechanistic framework to the study of animal and human behavior. Around 1800, this way of thinking was criticized by authors like Blumenbach and Goethe. Interestingly, these romantic scientists developed a view of organisms that is still central in the ecological approach. Despite their strong arguments against the mechanistic approach in biology and psychology, this approach prevailed. The cognitive perspective that was in vogue in

Gibson's time was clearly rooted in Cartesian thinking. I will end this chapter with a bold sketch of the cognitivist image of man, focusing on perception, emotion, and action.

In Chapter 2, I will sketch Gibson's ecological approach. We will see that Gibson strongly disputed mechanistic psychology, and, like the romantic scientists, emphasized that animals are integrated wholes that are inherently active and develop over time. After introducing some of the grounding concepts of Gibson's perspective, I will describe the "new vistas for psychology" (Reed, 1988, p. 296) that Gibson started to envision. At the end of his career he was touching upon some broader psychological topics (e.g., memory, cognition, imagination, the social) but he did not have the time to develop full-fledged theories of them. Yet it was clear to him that his ideas on perception and the environment had significant implications for psychology as a whole.

In Chapter 3, I will examine the relationship between affordances and emotions. Although Gibson conceived affordances as *possibilities* for action, later authors have suggested that they often solicit or invite behavior (e.g., Bruineberg & Rietveld, 2014; De Haan, 2020; Dings, 2018, 2021; Dreyfus & Kelly, 2007; Heft, 2010; Käufer & Chemero, 2015; Rietveld, 2008; Rietveld & Kiverstein, 2014; Withagen, De Poel, Araújo, & Pepping, 2012). That is, affordances not only make actions possible but also attract or repel animals in many different ways. In this construal, the affective relationship with the environment is naturally captured—the environment does something to us, it moves us. I will argue that Dewey's theory of emotions is an ally of this concept of invitations (see also Withagen, 2018). Building on the perspectives of James and Darwin, Dewey (1895) conceived an emotion as "one organic pulse" (p. 21) that is directed at the environment. This conceptualization allows for a theory of 'direct' emotions in which the Cartesian assumptions that both Dewey and Gibson aimed to overturn are absent.

Chapter 4 makes a plea for the primacy of developmental history. One of the phenomena that always strikes me is the individual differences in emotional responses in social settings. As a genuine ecological approach aims to explain lived experience and daily behavior, it has to account for these differences as well. I will rely on the insights of the clinical psychologist Miller to come to grips with these phenomena. Miller was a trained psychoanalyst, and although Freud's work has been appreciated by both the early Gibson (1950a, p. 152)

and his graduate school mentor (Holt, 1915), I will argue that Miller's perspective is more ecological than Freud's. Instead of pointing to children's frustrated fantasies, Miller focused on the history of genuine interaction of real persons. I will argue that Miller's insights into how childhood experiences affect adult emotional life can further the theory of invitations. However, to be neatly integrated into the ecological framework, Miller's approach had to be cleansed of its representational line of thinking. I will end the chapter with doing that.

Chapter 5 examines the question of whether the individual differences in emotional responses imply that we, or at least some of us, sometimes misperceive the affordances of the environment. The fact that a certain incident (e.g., a critical audience or an angry yelling man) can make one person scared or angry but leaves another person relatively untouched seems to imply that at least one of them was misperceiving the environment. Following Miller's insights, I will argue that misperception happens on a large scale in our daily life. Taking inspiration from phenomenology, I will sketch an ecological conception of misperception as a disturbed relationship with the environment. In addition, I will argue that we do not regulate our behavior with respect to the affordances of the environment (as many ecological psychologists assert), but with respect to its invitations. However, an affordance analysis of the environment can help in examining whether a certain behavior is adaptive and appropriate.

In Chapter 6, I will show how developmental systems theory can bridge the gap between Miller's insights and the ecological perspective. This theory can explain how childhood experiences (and injuries) affect a developing system, making it sensitive to certain situations to which it will respond in particular ways. And it does so without assuming that information is *stored inside* the organism's mind. Although developmental systems theory shares many assumptions with Gibson's perspective (e.g., Ingold, 2000; Turvey, 2009, 2019; Wagman & Miller, 2003; Withagen & Van Der Kamp, 2010), these two approaches vary in their concept of information. Gibson defined perceptual information relative to a point of observation in the environment. The perceiver was not included in his account. However, based on Oyama's thinking, I will argue that perceptual information has to be defined relative to the developing system it is affecting (or, more precisely, is actually part of). Such an account is needed to explain our emotional responses and the individual differences therein (Withagen, 2018).

In the Epilogue, I will tie up some loose ends. The main question I will address is whether the sketched perspective is Gibsonian. Although some of Gibson's pioneering concepts and ideas are jettisoned in this book, I pursue the logic of mutualism, arguably more consistently than Gibson himself did. A final plea for this metatheory is made.

1

THE MECHANISTIC FOUNDATION OF PSYCHOLOGY

In my view, the best way to understand the significance of Gibson's work is as a big critique of and alternative for the mechanistic tradition in psychology (e.g., Costall, 1995; Heft, 2001; Reed, 1996a). Ever since the 17th century, psychology has been dominated by the mechanistic way of thinking that Galileo and Newton, among others, introduced, and that was steadily applied to the study of man in the ensuing centuries. In this chapter, I will briefly sketch this tradition, not only to explain (the origin of) the cognitive approach that Gibson took issue with, but also to highlight some central themes and theories that will be discussed (and criticized) later in the book. I will start with a few words on the Aristotelian perspective and how this was replaced by "the mechanization of the world picture" (Dijksterhuis, 1950/1969). Then I turn to the influential work of Descartes and some of his followers. We will see that at the end of the 18th century, both animals and human bodies were conceived as machines, the movements of which can be understood in terms of mechanics. However, to account for intelligent behavior, a soul and later an intelligent organ (the brain) was introduced. Around 1800, the mechanistic way of thinking was heavily criticized by romantic scientists like Goethe, Schelling, and Blumenbach. Although the romantic movement in science has received scant attention in studies of the history of ecological psychology (e.g., Heft, 2001; Lombardo, 1987/2017; Reed, 1988), I will

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argue that it has been important. As we will see in the chapters that follow, the conception of organisms that the ecological approach adopts shows similarities with that of the romanticists. The romantic movement paved the way for Darwin's theory of evolution which in turn influenced the likes of James and Dewey in their critique of the mechanistic tradition in psychology. Yet this tradition prevailed—the cognitive approach that held great sway over psychology when Gibson developed his perspective was clearly rooted in the mechanistic way of thinking. I will end this chapter by broadly sketching the cognitivist image of man, focusing on perception, emotion, and action.

The mechanization of the inanimate world in a nutshell

In the 16th and 17th centuries a new way of thinking emerged in which the machine became the dominant metaphor. Several historians of science (e.g., Dijksterhuis, 1950/1969) and philosophers (e.g., Russell, 1946/1995) take the publication of Copernicus' *On the revolutions of heavenly spheres* in 1543 to be the starting point of this mechanization of the worldview. The introduction of the idea that the earth orbits around the sun (and not the other way around) has indeed been a watershed in our thinking of our place in the universe. And Kepler's subsequent claim that the planet orbits are elliptical rather than circular arguably marked a definite break with the scholastic tradition. However, for our purposes the contributions of Galileo and Newton to the mechanization of the worldview are more important. Especially Galileo forcefully argued against the Aristotelian perspective that dominated thinking for centuries.

Aristotle defended a broad conception of motion that is based on the distinction between potentiality and actuality. A seed, for example, is potentially a plant, and a piece of wood is potentially a table. From this distinction, movement can be understood as the change from potentiality to actuality. And according to Aristotle there are different ways in which this can occur. One of them is when objects are going to occupy a different place, but also when something comes into existence or disappears (an apple grows and decays), or when the nature of something alters (a caterpillar transmuting into a butterfly) there is movement—a transition from potential to actual being.

Crucially, according to Aristotle, this transition is at least partly the result of *telos* (purpose). In his worldview, there is a goal directedness in

both the animate *and* the inanimate world. Aristotle claimed that this must be the case because otherwise regularities in nature cannot be accounted for. After discussing several natural phenomena, including rain, Aristotle argued (quoted in Ackrill, 1981, pp. 41–42):

> For the things mentioned, and all things that are by nature, either always come to be in the same way or usually, whereas nothing that happens by luck or chance does so. […] So if, as it seems, things are either a coincidental result or for something, and the things we are discussing cannot be coincidental or a result of chance, they must be for something. But they are certainly natural—as our opponents themselves admit. The 'for something', then, is present in things that are, and come to be, by nature.

That is, also in the inanimate world there is a purpose. Hence, among the causes that Aristotle distinguished is a final cause that refers to the purpose of a phenomenon and that (partly) makes the phenomenon happen (e.g., it rains *because* the plants need water).

It was this teleological line of thinking that was heavily disputed during the mechanization of the worldview. Galileo banned the idea of a final cause. In his view, every motion can and should be explained in terms of mechanics—teleological explanations are no longer allowed. In addition, his conception of motion differed fundamentally from that of Aristotle. For Galileo, motion has nothing to do with changes from potentiality to actuality, but should simply be conceived as a change in position. And importantly, he argued that such displacement in and of itself does not require an explanation; rather only change of movement does. In 1632, Galileo introduced the idea that objects persist in their movements, unless a force is acting upon them. And a couple of decades later, Newton added two other laws of motion to this principle of inertia: force is coupled to acceleration (the second law of motion), and action is negative reaction (the third law of motion). With these three laws of motion, and the gravitational principle, a whole variety of movements in the inanimate world could be explained—from falling apples to Kepler's observations of planetary motion. Importantly, this unprecedented scientific triumph was accompanied by two other ideas that had a profound impact on psychology (and that were criticized by Gibson three centuries later): the machine metaphor and the two-worlds hypothesis.

The machine metaphor

The technical innovations in the 16th and 17th centuries (e.g., telescope, thermometer, barometer, air pump) not only made new scientific discoveries possible, but also inspired the new mechanistic way of thinking. Primarily the mechanical clockwork that originated in the 13th century, but was perfected in the 17th century, became the dominant metaphor. The planetary system, for example, was compared to a clock, emphasizing that its workings can also be understood in terms of mechanics. In Kepler's words (quoted in Rossi, 1962/1970, p. 141):

> The aim that I have set myself here is to affirm that the machine of the universe is not similar to a divine animated being, but similar to a clock, […] and in it all the various movements depend upon a simple active material force, in the same manner that all the movements of a clock are due to the simple pendulum.

The dominance of the machine metaphor fostered a new approach to understand nonliving and living systems alike—we should conceive them as an assemblage of parts (each with their own function), which we can understand by means of *decomposing*. That is, to come to grips with the functioning of a system, we need to study and understand the workings of the parts that together form the system. As the French mechanist Gassendi put it halfway the 17th century (quoted in Rossi, 1962/1970, p. 142; emphasis added):

> Concerning natural things, we investigate in the same way as we investigate things of which we ourselves are the authors. […] In the things of nature in which this is possible, we make use of anatomy, chemistry, and aids of all kinds, *reducing the bodies as much as possible, as though decomposing them,* to understand of what elements and according to what criteria they are composed.

And when we understand the functioning of the parts, we can reassemble them in thought, giving rise to a genuine understanding of the workings of the whole machine.

The two-worlds hypothesis

In addition, during the mechanization of the worldview a sharp distinction between primary and secondary qualities was made. Primary

qualities are properties of matter in motion (e.g., form, mass, speed) that exist *out there* in the world. Secondary qualities, on the other hand, are properties of perceptual systems and, thus, exist in the mental domain, not in the world itself. Consider Galileo's (1623/2008, p. 185; emphasis added) argumentation for making this distinction:

> I say that as soon as I conceive of a corporeal substance or material, I feel […] drawn by the necessity of also conceiving that it is bounded and has this or that shape; that it is large or small in relation to other things; that it is in this or that location and exists at this or that time; that it moves or stands still; that it touches or does not touch another body; and that it is one, a few, or many. Nor can I, by any stretch of the imagination, separate it from these conditions. However, my mind does not feel forced to regard it as necessarily accompanied by such conditions as the following: that it is white or red, bitter or sweet, noisy or quiet, and pleasantly or unpleasantly smelling […]. Thus, from the point of view of the subject in which they seem to inhere, […] tastes, odors, colors, etc., are nothing but empty names; rather they *inhere only in the sensitive body*, *such that if one removes the animal, then all these qualities are taken away and annihilated*.

Although this distinction between primary and secondary qualities might have worked for the physical sciences, it had a devastating effect on the social sciences. It resulted in the two-worlds hypothesis, the idea that there is a real world (as described by physics) and the perceived world (that is lodged in the skull). And these two are fundamentally different and, thus, can never correspond, implying that our perception is fundamentally illusory. As Whitehead (1925/1967, p. 54) expressed the mechanists' sentiment of that time:

> The poets are entirely mistaken. They should address their lyrics to themselves, and should turn them into odes of self-congratulation on the excellency of the human mind. Nature is a dull affair, soundless, scentless, colorless; merely the hurrying of material, endlessly, meaninglessly.

Although the mechanization of the worldview did not provide room for "our world of quality and sense perception, the world in which we live, and love, and die" (Koyré, 1965, p. 23), the scientific

accomplishments of Galileo and Newton nevertheless inspired thinkers to apply the mechanistic principles to the study of the animate world, including animals and human beings.

Descartes

The French philosopher René Descartes was one of the first thinkers who argued that animals are pure machines—their movements can be understood in terms of mechanics. Descartes was very much inspired by the hydraulic robots in the Royal Gardens in Paris. As he put it in his book *Treatise of man* (1633/1972, p. 21):

> [Y]ou may have observed in the grottoes and fountains in the gardens of our kings that the force that makes the water leap from its source is able of itself to move divers machines and even to make them play certain instruments or pronounce certain words according to the various arrangements of the tubes through which the water is conducted.

And if it is possible to make a mechanical robot whose movements mimic those of animals, then animal behavior might also be the result of the laws of mechanics. In his *Discourse on method*, Descartes (1637/1998) invited the reader to conceive animals as machines. Like planetary systems, animals can be compared to mechanical clockworks, the motion of which can be accounted for in terms of mechanics. In addition, Descartes argued that the human body is a machine as well. He developed the theory that nerves are hollow pipes through which animal spirits, "which are like a very subtle wind, or rather, like a very pure and lively flame" (Descartes, 1637/1998, p. 30), can flow. And if these spirits enter, for example, a muscle that is connected to the eye, then "they cause the whole body of the muscle to inflate and shorten and so pull the eye to which it is attached; while on the contrary, when they withdraw, the muscle disinflates and elongates again" (Descartes, 1633/1972, p. 25). Hence, the movements of our bodies follow the same principles as the movements of the hydraulic robots.

Yet, according to Descartes, humans are also equipped with an immaterial soul. Although Descartes believed that one could create a machine that can utter some words, he asserted that it was impossible to make one that is capable of using words in a meaningful way "as even the dullest man can do" (Descartes, 1637/1998, p. 32). In addition,

Descartes claimed that although it is possible to construct a machine that outperforms us in certain actions, it is impossible to create one that uses insight, that is truly intelligent. Hence, to account for our ingenuity, Descartes introduced an incorporeal soul, the essence of which is thinking. Thus, although many of our movements can be explained in terms of mechanics, our intelligent behavior results from our rational, immaterial soul that is imposing its will on the mechanical body.

Descartes' theory of perception

In addition to the above mind–body dualism, Descartes developed a theory of perception that, although not very precise, has been highly influential too. The French philosopher adopted the idea of primary and secondary qualities that the likes of Galileo had defended. However, Descartes was intrigued by the question of whether secondary qualities (and perception in general) can be explained scientifically, that is, in terms of primary qualities (Reed, 1982a).

Writing mainly about visual perception, Descartes made a distinction between three phases in the perceptual process. In the first phase, the light impinges on the eyes and gives rise to 'brain motion', a process that can be understood in terms of mechanics. In the second phase, the mind becomes aware of the state of the body. This is the stage at which secondary qualities come into existence. As Descartes put it in his essay *Optics* (1637/1999, p. 64):

> All the qualities which we perceive in the objects of sight can be reduced to six principal ones: light, color, position, distance, size and shape. First, regarding light and color (the only qualities belonging properly to the sense of sight), we must suppose our soul to be of such a nature that what makes it have the sensation of light is the force of the movements taking place in the regions of the brain where the optic nerve-fibers originate, and what makes it have the sensation of color is the manner of these movements. Likewise, the movements in the nerves leading to the ears make the soul hear sounds; those in the nerves of the tongue make it taste flavors […].

Descartes was convinced that the soul was deprived of a direct perceptual contact with the environment—it has access only to the state

of the body. Thus, to explain how we can be aware of the world 'out there', Descartes introduced a third stage in the process of perception. The soul is capable of reasoning and, thus, can try to infer what is out there in the world based on the state of the body. Among the theories that Descartes developed was the theory of distance perception through binocular convergence. Making a comparison with a blind man using two intersecting sticks to feel distance, Descartes argued that based on information about the angle of the eye vergence and the distance between the two eyes, our soul is capable of inferring the distance to the point the person is looking at. That is, although we have access only to the states of our body, we can gain knowledge of the environment by deducing what primary quality could have caused these bodily states.

Completing the mechanization of the worldview

The promise that we can explain movements in the inanimate *and* animate world with the same physical principles was thrilling for several scientists in the 17th and 18th centuries. A couple of decades after Descartes had introduced the idea that our body is a machine, the Italian scholar Borelli published his *On the movement of animals*. In the first lines of this landmark book, his highly ambitious program was laid out (Borelli, 1680–1681/1989, p. 6; emphases added):

> I tackle the difficult physiology of movements in animals. The study of this subject has been attempted by many ancient authors and by more recent ones. To my knowledge, however, nobody has described or even suspected the innumerable, remarkable, and interesting problems which are involved and can be discussed. Nobody has succeeded so far in confirming or solving these problems by using demonstrations based on *Mechanics*.
>
> I undertook this work, not only to illustrate and enrich the part devoted to Physics by mathematical demonstrations but to *enlist Anatomy into Physics and Mathematics not less than Astronomy*.

Thus, just like planetary motion can be explained in mechanistic terms, so it is with the movements of animals. Whereas Descartes was eager to apply the machine *metaphor* to animals and the human body, Borelli really started to determine the forces and moments on the body, and thereby founded the field of biomechanics. In addition, and

in line with Descartes, Borelli defended the idea of an incorporeal soul. Trying to do full justice to Galileo's inertia principle, Borelli (1680–1681/1989) argued that, "muscle by itself is a dead and inert machine in the absence of an external motive force" (p. 7). And, if matter in and of itself is not capable of movement but simply responds to the forces acting upon it, it seems that one has no option but to introduce an immaterial substance to account for intelligent behavior (Turvey, 1990).

However, in the 17th and 18th centuries several philosophers broke with this substance dualism, and defended a materialistic view (e.g., De La Mettrie, 1748/1994; Hobbes, 1651/2014). This was partly due to the great progress that was made in creating automata. The French inventor De Vaucanson was a leading figure in that movement. Although at that time, robots were often created to entertain the public, De Vaucanson tried to complete the mechanization of the worldview—he aimed to show that many physiological and psychological processes can be mechanically realized (Fryer & Marshall, 1979). When working on his famous Digesting Duck, De Vaucanson (1742/1979) penned in his memoirs, "I have endeavored to make it imitate all the actions of the living animal, which I have considered very attentively" (p. 23). Besides his wonderful mechanical duck, De Vaucanson created numerous other machines. Among them was a robot capable of actually playing 12 songs on a flute, an action that many took to be exclusively human.

These technical accomplishments inspired philosophers like De La Mettrie (1748/1994, p. 69; emphases in original) to defend a materialistic image of man:

> It is obvious that there is only one substance in the universe and that man is the most perfect animal. Man is to apes and the most intelligent animals what Huygens' planetary pendulum is to a watch of Julien le Roy. If more instruments, wheelwork, and springs are required to show the movements of the planets than to mark and repeat the hours, if Vaucanson needed more art to make his *flute player* than his *duck*, he would need even more to make a *talker*, which can no longer be regarded as impossible […].

Hence, whereas Descartes had argued that talking and intelligence require an incorporeal soul, De La Mettrie suggested that these

phenomena can be mechanically realized. It is simply a matter of time before machines are created that simulate these psychological functions.

However, this mechanistic image of man was deeply problematic. Granted, by introducing a soul, Descartes created the insolvable problem of how an incorporeal substance can intervene in the physical world—how can an immaterial soul put a mechanical body into action? As is well acknowledged in the literature, such an influence would be inconsistent with the mechanistic world picture that Descartes defended. Yet, Descartes was consistent in not attributing intelligence to matter. For materialists like Hobbes and De La Mettrie this was no longer an option. However, if matter does not have a purpose and is not goal-oriented (as Aristotle claimed), but is passive and only comes into motion if an external force acts upon it (as Galileo asserted), then it becomes difficult to explain how intelligent behavior comes about. The only option would be to introduce a control system that although being pure matter is nevertheless capable of intelligence. Both Hobbes and De La Mettrie opted for this strategy. Inspired by Harvey's discovery of the circulation of the blood, Hobbes designated the heart as 'the prime mover'. However, in the 17th century, after extensive empirical research, Willis suggested that mental illnesses are related to brain anatomy. And although Willis himself still defended the soul, his observations fostered the idea that the brain is the control system of the mechanical body (Zimmer, 2004). In fact, in the 18th century this idea became dominant. To quote De La Mettrie (1748/1994, p. 62; emphasis added) once more:

> But there is another, more subtle and marvelous [spring], that animates everything. It is the source of all our feelings, pleasures, passions, and thoughts, for the brain has its muscle for thinking as do the legs for walking. I mean that impetuous autonomous principle that Hippocrates calls […] soul. This principle exists and is seated in the brain at the point of origin of the nerves through which it *exercises its rule over all the rest of the body*. It is the explanatory principle of all that can be explained, including even the surprising effects of the maladies on the imagination.

And ever since, the idea that perception, cognition, and emotion reside in the brain, and that this jelly organ instructs the mechanical body

is the dominant view in psychology and philosophy, notwithstanding some serious critique.

The romantic period

As the 18th century drew to a close, several authors put forth the idea that living systems differ fundamentally from nonliving systems, and cannot be understood in terms of mechanics. The German romantic scientists Blumenbach, Schelling, and Goethe were among the scholars who rebelled against the mechanistic way of thinking in biology and psychology. They were in dialogue with the enlightenment philosopher Kant who had argued in his *Critique of the power of judgment* that there is a fundamental difference between machines and organisms. Unlike the parts of a machine, the parts of an organism are reciprocally ends and means. In Kant's (1790/2000, p. 246; emphasis added) words:

> In a watch one part is the instrument for the motion of another, but one wheel is not the efficient cause for the production of the other: *one part is certainly present for the sake of the other but not because of it*.

Although the parts of a machine *move* by virtue of one another, they do not *exist* by virtue of one another. In the organism, on the other hand, there is an interdependence of (at least some) pieces of anatomy. For example, the heart exists by virtue of the lungs, and vice versa.

Kant argued that this mutual dependence implies that in the investigation of animals one first needs to understand *the purpose* of the whole before the parts can be meaningfully studied. That is, teleological analyses are indispensable in biology. As an example, one first needs to understand the function of a bird (e.g., flying through the air, making nests, eating insects) before one can understand the (characteristics of the) parts and their configuration. Only in light of the general purpose of the whole, do the working and anatomy of the parts make sense. This means that the approach of decomposing that the mechanists adopted is misguided. Instead of moving directly to the parts, one first needs to analyze the functioning of the organism as the whole.

Although Kant argued that a teleological approach cannot be dispensed with in biology, he nevertheless stated that one cannot

include them in the *scientific discourse* on organisms. Discussing events in nature, Kant (1790/2000, p. 259; emphases in original) claimed:

> I *should* always *reflect* on them *in accordance with the principle* of the mere mechanism of nature, and hence research the latter, so far as I can, because if it is not made the basis for research then there can be no proper cognition of nature.

Kant remained wedded to the mechanistic framework that was introduced in the 16th and 17th centuries. In his view, a teleological analysis is an indispensable *heuristic*—we should analyze organisms *as if* they have a purpose, but the ultimate goal of this analysis is to find the mechanistic principles that underlie their functioning (Richards, 2002). And it is only these latter principles that can serve in a genuine scientific explanation.

Blumenbach and the theory of epigenesis

Blumenbach was one of the romantic scientists who was in dialogue with Kant about, among other things, the nature and development of animals. In the 17th and 18th centuries there was a heated debate about animal development. Several scholars defended the so-called preformation theory that holds that at the Creation, God had produced a miniature of every plant and animal. As Garden (1691, p. 476; emphases in original) put it:

> All vegetables we see do proceed *ex plantula*, the seeds of vegetables being nothing else but little plants of the same kind folded up in coats and membranes: and from hence we may probably conjecture that so curiously an organized creature as an animal, is not the sudden product of a fluid or *colliquamentum,* but does much rather proceed from an animalcle of the same kind, and has all its little members folded up according to their several joints and plicatures, which are afterwards enlarged and distended, as we see in plants.

For the mechanists, the phenomena of development and reproduction had always been a thorny issue. As Fontenelle famously put it at the end of the 17th century, "[p]ut a male and a female dog-machine side by side, and eventually a third little machine will be the result, whereas

two watches will lie side by side all their lives without ever producing a third watch" (quoted in Grene & Depew, 2004, p. 83). Yet, the theory that every animal already exists as a miniature at the Creation was at least not inconsistent with the mechanization of the world picture—after all, for enlarging, the miniature only needs to balloon out, and this can be accounted for in terms of mechanics. Still, within the preformation approach, there was a lively debate about whether the little persons reside in the egg or in the sperm, and even the newly invented microscope failed to settle the debate completely.

In the 18th century, this preformation theory was increasingly criticized by proponents of the theory of epigenesis. This latter theory, which finds its origin in the work of Aristotle, holds that development is a process of transformation—development occurs in successive states in which organs and their organization are formed gradually. Among others, the German biologists Wolff and Von Baer closely observed the ontogeny of different animals and saw evidence for this process. In Von Baer's words, "[a]ll is transformation, nothing is development *de novo*" (quoted in Gottlieb, 1992/2008, p. 6; emphasis in original). Yet, the nature of this developmental process, the acting toward ends, was difficult to account for in mechanistic terms. After all, the end-state (the adult organism) seems to determine the course of the process, which is not compatible with the mechanistic conception of causation in which the cause necessarily precedes its effect.

Blumenbach was involved in this debate between the preformationists and the epigenesists. Although he defended the idea of preformation in his early years, he became a forceful proponent of the theory of epigenesis (Richards, 2002). Several observations of the process of regeneration led him to conclude that preformation is wrong and that development takes place. And to account for this development, Blumenbach (quoted in Richards, 2002, pp. 218–219; emphases in original) introduced a new force at the end of the 18th century:

> [T]here exists in all living creatures […] a particular inborn, lifelong active drive [*Trieb*]. This drive initially bestows on creatures their form, then preserves it, and, if they become injured, where possible restores their form. This is a drive (or tendency or effort, however you wish to call it) that is completely different from the common features of the body generally; it is also completely different form the other special forces [*Kräften*] of organized

> bodies in particular. […] In order to avoid all misunderstanding and to distinguish it from all the other natural powers, I give it the name of *Bildungstrieb (nisus formativus)*.

Hence, whereas Kant used a teleological analysis as a heuristic, analyzing systems *as if* they have a purpose, Blumenbach introduced a genuine final cause to explain development (Richards, 2002). This resulted in a richer scientific framework to understand the nature and functioning of animals. Scientists were no longer forced to rely exclusively on mechanistic principles but could now draw upon a formative force as well. Interestingly, Blumenbach (quoted in Richards, 2002, p. 226; emphases in original) modelled this formative force on the physical forces that were introduced by the founders of the mechanization of the world picture, possibly to make it more digestible for the scientific community:

> I hope it will be superfluous to remind most readers that the word *Bildungstrieb*, like the word attraction, gravity, etc. should serve, no more and no less, to signify a power whose constant effect is recognized from experience and whose cause, like the causes of the aforementioned and the commonly recognized natural powers, is for us a *qualitas occulta*.

The significance of the romantic period

The romantic period usually receives scant attention in histories of science and psychology, or is even ridiculed (e.g., Wilson, 1998). Yet this period marked a breakaway from the mechanistic way of thinking that proved to be crucial in the history of biology (e.g., Richards, 2002). In addition, and importantly for the purposes of this book, when criticizing the cognitive approach, Gibsonian psychologists often used ideas and arguments that have been put forth by the romanticists two centuries earlier (see e.g., Reed, 1996a).

Among other things, the romanticists developed a new conception of animals. In their view, the machine metaphor is misguided—it is not capable of capturing the essential characteristics of living systems. The then popular metaphor of the mechanical clockwork suggests that animals are passive, can be understood as an assemblage of parts, and although move do not develop. And none of these characteristics apply to even the simplest animals as the romantic scientists stressed.

Importantly, during the romantic period, the theory of epigenesis defeated the preformation theory—scientists started to accept the plain fact that animals develop over time. Moreover, in his books on biology, Goethe (1790/1999; 1817–1824/1999) even stressed that the study of the transformations of animals and plants (their metamorphosis) is the key to come to grips with their nature. That is, to understand an organism, we should focus not on studying its movements but its development.

Following Kant's line of thinking, the romanticists further stressed that living systems cannot be understood as an assemblage of parts. Rather, animals and plants are integrated wholes that organize themselves. Moreover, the function of a part depends on the system it participates in—that is, the function is not inherent in the part; rather it is the context that determines it. Thus, unlike machines in which the parts form the whole, in organisms the whole determines the parts. And according to the romanticists this implies that the approach of decomposing will not work—one first needs to understand the whole (and the function of it) before one can study the parts. In Chapter 2, we will see that Gibson followed this line of thinking when developing his perspective on organisms and the functioning of the nervous system (see also Reed, 1996a).

The cognitive perspective

The romantic movement paved the way for Darwin's theory of evolution (Richards, 2002), which, in turn, provided further arguments for why a new psychology was needed. Indeed, Darwin (1859/1985) was convinced that his theory of evolution would provide psychology with a "new foundation" (p. 458). Moreover, at the end of his life, he did some wonderful studies on the behavior of earthworms, showing that their behavior is not machine-like as Descartes had surmised (Darwin, 1881, see also Costall, 2004; Reed, 1982b). As I will argue in more detail in Chapter 3, Darwin's naturalistic way of thinking inspired authors like James (1890/1950) and Dewey (1896) in developing their nonmechanistic psychologies. Yet, despite their compelling plea for a new psychology, the machine metaphor remained dominant in biology and psychology. In the 1960s and 1970s, when cognitive psychology was in its ascendency, humans, or more precisely their brains, were compared to computers. The brain is an information processing device with several modules, each of which performs their

own function in the overall information processing enterprise. Fodor (1980), one of the founders of the cognitive movement in psychology, explicitly mentioned that he basically followed Descartes' perspective. Moreover, the Cartesian idea that the body in and of itself is not capable of intelligent behavior, but that such behavior requires something 'higher' that instructs the body, has been dominant in cognitive psychology. As Gallistel (1981, p. 609) put it:

> The combining of elementary units to make complex units gives behavior and the neural circuitry underlying behavior a hierarchical structure. Circuits at higher levels govern the operation of lower circuits by selective potentiation and depotentiation: by regulating the potential for operation in lower circuits—raising the potential for some and lowering it for others—a higher unit establishes the overall pattern to be exhibited in the combined operations of the lower units, while leaving it to the lower units to determine the details of the implementation of this pattern.

And Descartes' theory of perception has also gripped much thinking in psychology for centuries (Reed, 1982a). The idea that we do not have direct access to the world but only to our bodies has been one of the central tenets of the vast majority of perception theories. About two centuries after Descartes laid out his perspective, the German physiologist Müller (1837–1840/1938) claimed, "[t]he immediate objects of the perception of our senses are merely particular states induced in the nerves […]" (p. 1073). Consequently, the perceived world originates in the brain, and may or may not correspond with the real physical world. As Müller (ibid.) put it, "[i]n our intercourse with external nature it is always our own sensations that we become acquainted with, and from them we form conceptions of the properties of external objects, *which may be relatively correct*" (p. 1068; emphasis added).

This idea held great sway also when Gibson developed his ecological approach in the 1960s and 1970s. In his landmark book *Cognitive psychology*, Neisser (1967, p. 3) laid out a view strikingly similar to the ones that were defended by Müller and Descartes:

> We have no direct, immediate access to the world, nor to any of its properties. […] [The] patterns of light at the retina […] bear

> little resemblance to either the real object that gave rise to them or to the object of experience that the perceiver will construct as a result.

Again, we see that a distinction is made between 'the real object' and 'the object of experience', the former being in the world, the latter residing in the head. Moreover, because of the 'little resemblance' of the retinal image and the real object, the perceiver is in a state of uncertainty about what is 'out there' in the environment.

Appraisal and emotions

The cognitive approach conceived human beings primarily as rational agents. Still, the idea that we are also affective beings was addressed, at least by some (e.g., Arnold, 1960; Frijda, 1986; Lazarus, 1966). Although there was a myriad of emotion theories around (e.g., Darwin, 1872/1998; Dewey, 1894, 1895; James, 1884, Schachter & Singer, 1962), from the 1960s to the 1980s the cognitive appraisal theory of emotions was most popular. In keeping with Descartes' perspective, this theory holds that the stimulus innervating the organism's sense organs is meaningless. Hence, emotions are not the result of a stimulus itself, but of an appraisal of that stimulus. As Frijda (2007/2013), a life-long advocate of the appraisal theory, claimed, "[i]t is meanings and the individual's appraisals that count; not stimuli or events per se. Events are not pleasant or unpleasant by themselves; they are appraised, apprehended that way" (p. 5).

This theory is well equipped to account for individual differences in emotional responses to a certain event. After all, different individuals can appraise the event differently, due to "stored, associated information" (Frijda, Ridderinkhof, & Rietveld, 2014, p. 3) that gives meaning to the stimulus. As a result, we can get a variety of emotional reactions to the same event. However, and as alluded to in the previous paragraph, this explanation, and the appraisal theory in general, rests upon the two-worlds hypothesis—a distinction is made between the real world that is basically meaningless, and the perceived world (lodged in the skull) in which meaning is added to a stimulus. Relatedly, and also following the Cartesian perspective, mind (including emotion) is conceptualized as being sandwiched between the physical event in the world and the behavior that the agent may or may not perform.

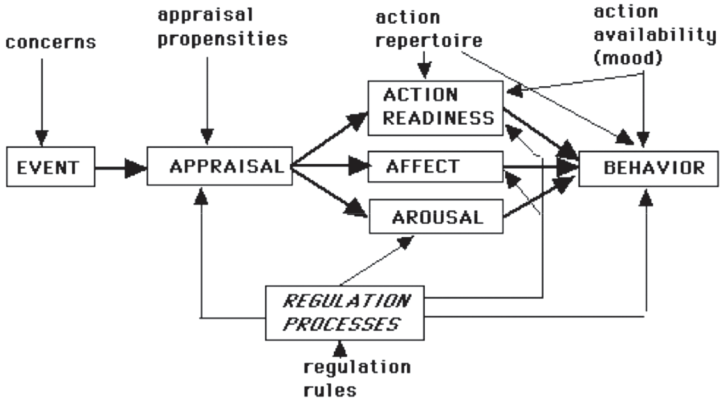

FIGURE 1.1 Frijda's theory of the emotion process. (From figure 1.1, Frijda, 2007/2013, reprinted with permission, Routledge.)

Consider, for example, the theory of emotion that Frijda (2007/2013) forwarded (see Figure 1.1). Although he stressed that emotions have adaptive value and guide our behavior in the world, Frijda presented us with a box diagram that is typical of the models that were developed during the heyday of the cognitive revolution (but see Frijda [2016] for a more biologically motivated account of emotions). Although there are many feedback loops in the model, indicating that it is not a pure sequential process, the different boxes all perform their own, unique function. In addition, Frijda (2007/2013, p. 42) claimed that the emotion or passion exists independently of the action that is likely but not necessarily the result of it. Hence, an emotion is not *in* the action, but lies *behind it*, nicely situated between the appraisal of the objective event and the behavioral response. Moreover, to account for the actual behavior, Frijda (2007/2013, p. 42) relied upon the earlier discussed cognitive theories that state that behavior is the result of a motor program instructing the body what to do:

> Motive states in emotions are organizers. They are high-level processes in a hierarchical process architecture. They potentiate sets of action programs that in turn potentiate higher level action programs that potentiate lower level motor programs that potentiate muscle activity, increasingly specifying action readiness in the process.

Toward an ecological alternative

In the remainder of this book, I aim to overturn this mechanistic tradition in psychology. I will try to do so by sketching an ecological account of perception, emotion, and action. One that is not based on the idea that the environment is meaningless. One that does not treat perception as an internal process in which meaning is attached to a stimulus. One that does not state that there is a real world 'out there' and a perceived world in the head. One that does not conceive human and nonhuman animals as passive machines. One that is not based on the idea that our body is a machine that is controlled by something 'higher' like a soul or a brain. One that does not take the mind to be sandwiched between the stimulus and the response. One that does not consider decomposing to be a fruitful approach to understand the functioning of organisms. Instead, and following the romantic tradition, I will treat organisms as integrated wholes that develop over time. I will consider the environment itself to be meaningful, something that matters to animals, that can solicit action. I will conceive perception as a bodily process that allows the animal to be in touch with this meaningful environment. I will argue that this conceptualization can also account for the strong individual differences in emotional responses to events. I will argue that emotions should be conceived not as mental states but as modes of behavior. And to develop this perspective I will take, as always, the Gibsonian approach to psychology as my point of departure.

2

GIBSON'S ECOLOGICAL PROGRAM

Gibson's ecological perspective is diametrically opposed to the mechanistic tradition in psychology that I have sketched in Chapter 1. Indeed, Gibson was convinced that the mechanistic assumptions had set psychology on the wrong course. In many ways, his ecological perspective was highly original and provided psychology with an alternative conceptual framework that allows for a new (empirical) study of animal behavior. Obviously, and as we have seen in Chapter 1, Gibson was not the first theorist who rebelled against the mechanistic tradition. Also, in the 20th century, both Heidegger (1927/1962) and Merleau-Ponty (1945/2014) had taken aim at the Cartesian perspective and sketched phenomenological alternatives. In this chapter, I will limit myself, however, to the work of Gibson, although some of the thinkers who influenced him will be briefly mentioned. There is a significant development in Gibson's thinking. Although he was critical of traditional approaches from the very start of his career, his ecological perspective took shape mainly in the final two decades of his life. Especially after finishing his first book, *The perception of the visual world* (1950b), there is a serious progression toward his ecological account (Reed, 1988). However, for the purposes of this book, the evolution of Gibson's thinking is not crucial (for excellent accounts of this development see Heft, 2001; Lombardo, 1987/2017; Reed, 1988). Rather, what is important, and what I will focus on here, is the ecological

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perspective that Gibson laid out in his final books, *The senses considered as perceptual systems* (1966) and *The ecological approach to visual perception* (1979/1986), and some landmark papers.

I will start this chapter with a few words on Gibson's life. Subsequently, I will describe the grounding concepts of his ecological perspective. We will see that Gibson claimed that an animal is not a passive machine but an inherently active organism that regulates its encounters with a meaningful world. After a portrayal of Gibson's main ideas, I will describe some of his thoughts on memory, imagination, culture, and the social. Importantly, these thoughts were not developed into full-fledged theories. Yet they show that Gibson's pioneering approach to perception can pave the way for a new psychology, one that I aim to further in the chapters that follow. It is important to stress that in this chapter I will simply describe the central tenets of Gibson's framework. In later chapters, I will discuss some of his more specific claims that have been criticized by other ecological psychologists or that I will ultimately reject myself.

Gibson's ecological approach

Gibson was born in a small village in Ohio in 1904. His mother was a school teacher, his father worked at the railways. Interestingly, the job of his father had an impact on Gibson's later theorizing on the information that is available in the ambient light. As Gibson (1967/2020) himself put it in his autobiography, "at the age of eight, I knew what the world looked like from a railroad train and how it seemed to flow inward when seen from the rear platform and expand outward when seen from the locomotive" (p. 7).

After finishing high school, Gibson moved to Princeton where he eventually majored in philosophy and graduated on an empirical study on how to draw visual forms from memory. Among his teachers at Princeton was Edwin Holt. This former student of William James had developed new ideas on consciousness and the conceptualization of behavior. Arguing strongly against reductionist and mechanistic views that conceive behavior as a (functionally indifferent) mechanical response that is caused by a stimulus, Holt (1915) developed the theory that behavior is a "constant function of some aspect of the objective environment" (p. 166), thereby emphasizing the functional role of behavior. Gibson (1967/2020) was impressed by Holt's "clarity of thought that has never been matched" (p. 9) and came under

the influence of his perspective (Heft, 2001). And although Gibson jettisoned many of Holt's ideas during his career, at the end of his life he still considered himself to be a Holtian behaviorist (Gibson, 1967/2020, p. 12).

After receiving his degree, Gibson moved to Smith College to work as an assistant professor in psychology. At that college, he met Eleanor who became an influential developmental psychologist and his wife (e.g., E.J. Gibson, 1969; E.J. Gibson & Pick, 2000). In 1949, James Gibson took a job at Cornell University, where he and later Eleanor worked for the rest of their academic lives. Although Eleanor pioneered an ecological approach to development, the major theoretical advances in the ecological framework were made by James. Hence, I will discuss mainly his work in this book. And to not include his first name throughout the whole book, I will refer to James Gibson as Gibson.

An ambitious program

Gibson had an ambitious program. Whereas many theorists of perception focus their research on a certain aspect of perception (e.g., illusions, prism adaptation), Gibson aimed to understand how animals make their way in the world. As he put it in the first lines of his final book, *The ecological approach to visual perception* (Gibson, 1979/1986, p. 1):

> This is a book about how we see. How do we see the environment around us? How do we see its surfaces, their layout, and their colors and textures? How do we see where we are in the environment? How do we see whether or not we are moving and, if we are, where we are going? How do we see what things are good for? How do we see how to do things, to thread a needle or drive an automobile? Why do things look as they do?

And by phrasing the subject matter of his psychology this way, Gibson already broke with the dominant perspective—psychology is not about mental processes that occur inside the head, it is not about the subjective world, what happens between 'the input' and 'the output', 'the stimulus' and 'the response'; rather it is about how animals, humans included, adaptively cope with the environment. And to understand this essential characteristic of animal life, Gibson (1979/1986, p. xiii;

emphases added) asserted that the then-available knowledge of optics, anatomy, and physiology was simply irrelevant:

> Optical scientists, it appeared, knew about the light as radiation but not about light considered as illumination. Anatomists knew about the eye as an organ, but not about what it can do. Physiologists knew about the nerve cells in the retina and how they work but not about how the visual system works. *What they knew did not seem to be relevant*. They could create holograms, prescribe spectacles, and cure diseases of the eye, and these are splendid accomplishments, *but they could not explain vision*.

After making such bold claims in the introduction of his final book, Gibson laid out an alternative conceptual framework. One that aims to describe perception at an ecological level in which the animal–environment relation rather than the 'inner mental world' was the focus of study.

The meaningful environment

Gibson argued that the mechanistic conception of the environment was deeply problematic for psychology. As we have seen in Chapter 1, by making a distinction between primary and secondary qualities, Galileo had argued that the environment consists exclusively of matter and motion, and is, thus, meaningless. In his book *The concept of consciousness*, Holt (1914/1973, p. 181) had already rebelled against this idea:

> [C]onsciousness or mind is not inside the skull nor secreted anywhere within the nervous system; but all the objects that one perceives, including the so-called 'secondary qualities', are 'out there' just where and as they seem to be.

That is, in Holt's view, color, taste, smell, and meaning are not properties of perceptual systems (as Galileo and Descartes had argued); rather, like form, mass, size, and speed, they are properties of the environment. Gibson followed his graduate school mentor in rejecting the distinction between primary and secondary qualities (e.g., Gibson, 1966, p. 308; Gibson 1979/1986, p. 31), but moved beyond Holt's theory by offering psychology an alternative, and arguably more useful,

description of the environment. In his view, animals do not perceive and live in a "physical world consisting of bodies in space" (Gibson, 1979/1986, p. 16), but in an environment that consists of possibilities for action. He coined these possibilities *affordances*. Although he had already hinted at this idea in his first book, *The perception of the visual world* (1950b, pp. 198–199), the concept was introduced and developed in the 1960s and 1970s. In his final book, Gibson (1979/1986, p. 127; emphases in original) offered his well-known definition:

> The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes*, either for good or for ill. The verb *to afford* is found in the dictionary, but the noun *affordance* is not. I have made it up.

For example, for many humans a chair is sit-on-able, the field of grass is walk-on-able, water is drinkable, and so on. It is important to stress that Gibson introduced the concept of affordances to overcome the subject–object framework that originated in the 17th century—the meaningless objective world over and against the living subject. In his words (Gibson, 1979/1986, p. 129; emphasis added):

> An important fact about the affordances of the environment is that they are in a sense objective, real, and physical, unlike values and meanings, which are often supposed to be subjective, phenomenal, and mental. But, actually, an affordance is neither an objective property nor a subjective property; or it is both if you like. *An affordance cuts across the dichotomy of subjective-objective and helps to understand its inadequacy.* It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither.

That is, Gibson replaced the traditional animal–environment dualism with a mutualist perspective in which animal and environment define one another. Indeed, to describe the animal's environment in terms of affordances, it should be measured relative to the animal. For example, whether a cup is graspable for me depends on the size of the cup relative to the span of my hand. Hence, contrary to the mechanistic conception of the environment in which we were "excluded", an ecological conception, that is, one in terms of affordances, "includes 'us'"

(Costall, 1999, p. 412)—the environment is described in terms of what a particular animal can do in it.

Moreover, an environment consisting of affordances is a meaningful environment. As Gibson (1971/2020) put it, "[t]he meaning or value of a thing consists of what it affords" (p. 407). The affordances of the cup determine what I can do with it and, thus, what it means to me. Hence, meaning is not subjective, residing in the head, but is in the environment of a particular animal. Importantly, and as emphasized by Gibson (1979/1986, p. 33; emphasis in original), this implies a completely new view of what perception (and arguably life in general) entails (see also Reed, 1996b):

> The world of physical reality does not consist of meaningful things. The world of ecological reality, as I have been trying to describe it, does. If what we perceived were the entities of physics and mathematics, meanings would have to be imposed on them. But if what we perceive are the entities of environmental science, their meanings can be *discovered*.

Hence, Gibson's reconceptualization of the environment as something meaningful allows for a significant breakaway from the Cartesian perspective on perception—it is not a process of creating a perceived world in the head, attaching meaning to impoverished stimuli that impinge on the sense organ. Rather, perception can be conceived as a process of discovering the meanings in the environment.

Information and direct perception

To explain how animals can perceive these meanings, Gibson broke with the widely held assumption that animals are deprived of a direct perceptual contact with the environment. Among his sources of inspiration was Darwin's theory of evolution. As Gibson (1966) complained in his book on the senses: "The classics of vision were unaffected by evolutionary considerations or by knowledge of animal behavior but nevertheless they dominate the theories of perception" (p. 155). In one of the final paragraphs of his *The origin of species*, Darwin (1859/1985) had indeed argued that his theory of evolution would have huge implications for psychology. However, not only does that theory imply that "each mental power and capacity" is acquired "by gradation", as

Darwin (1859/1985, p. 458) suggested, it also provides a new perspective on the function of perception. From an evolutionary perspective, the primary function of perception is not to gain knowledge of the environment (as many spectator theories of perception has assumed), but to guide the animal's activity in it. Yet, and as we have seen in Chapter 1, many post-Darwinian theories of perception (e.g., Neisser, 1967) follow pre-Darwinian theories (e.g., Descartes, 1637/1999), both in the idea of what perception is (a mental state in the head) and in the idea of how it comes about (the enrichment of stimulus information) (see Glotzbach & Heft, 1982; Heft, 2007; Withagen & Chemero, 2009).

Placing evolution and ecology more central, Gibson opted for a different conceptualization of perception. Already in 1959, when his ecological perspective was not fully matured, Gibson (1959) defined perception as "the process by which an individual maintains contact with his environment" (p. 457). Hence, perception is not a mental state, residing in the head, but a "keeping-in-touch with the world" (Gibson, 1979/1986, p. 239). And to explain how this perceptual contact is established, Gibson developed his theory of ecological information.

In the 1960s he started working on this theory by introducing an "ecological optics" (Gibson, 1961). Contrary to classical optics that focuses on light as such, ecological optics centralizes the relation between the structure of the light and the environment. A fundamental notion of this optics is the idea of the ambient array. As Gibson (1961) defined it in one of his first articles on ecological information: "An optic array is the light converging to any position in the transparent medium of an illuminated environment insofar it has different intensities in different directions" (p. 255). Note that Gibson defined the optic array with respect to a point of observation. That is, an optic array is external to the eye, and should not be confused with a retinal pattern. Moreover, the structure of the light in the array depends on the surfaces that reflect the light. And "because mirrors are rare in nature" and surfaces "reflect the light diffusely" lawfully depending on their properties (Gibson, 1961, p. 254), the ensuing patterns in the ambient array are specific to their sources. That is, they provide information about them. According to Gibson, this conception of ecological information allows for a theory of direct perception. Indeed, if animals are capable of picking up the patterns in the ambient arrays that specify their source, then they are in direct perceptual touch

with their environment. No inferential processes are needed then, no perceived world has to be created.

The concept of ecological information was central in Gibson's later work, and he spelled out several important implications of it. Among other things, Gibson argued that this concept can explain how animals navigate in the world. When the point of observation changes, the ambient array changes as well, giving rise to an optical flow field. Importantly, this flow field is lawfully related to the animal's movement through the environment. For example, it has a focus of expansion, a point out of which the flow radiates, that specifies the direction the animal is heading. Consequently, this information can be used in the guidance of locomotion—if an animal intends to move toward a certain object, the animal has to make sure that the focus of expansion coincides with that object (see Gibson [1958] for an impressive early account of the laws of locomotion).

Moreover, Gibson asserted that the concept of information requires us to rethink the role of the brain. As we have seen in Chapter 1, in the 18th century the idea emerged that all psychological processes worth the name take place in the brain which imposes its will on the mechanical body. Based on the concept of information, Gibson rejected this theory. "[Locomotion and manipulation] are controlled not by the brain but by information, that is, by seeing oneself in the world. Control lies in the animal-environment system" (Gibson, 1979/1986, p. 225). This is not to deny that the brain is an important organ in perceiving and acting, but according to Gibson one should not think of it as a controller of the (rest of the) body. Control is distributed across the animal–environment system, and the just discussed relationship between locomotion and optic flow offers a case in point.

Perception as an activity of a body in an environment

To explain how animals pick up the information in the ambient arrays, Gibson developed new ideas on perceptual systems. He rejected the dominant idea that animals are passive receivers of stimuli. In fact, he completely overturned the stimulus–response framework that held both behaviorists and cognitivists captive at his time. Perception, Gibson (1979/1986) asserted, is not a response but an "achievement of an individual" (p. 239). Like the romantic scientists, Gibson stressed that animals are integrated wholes that are inherently active, and a careful study of perceiving animals reveals this—in the never-ending process

of perceiving, animals actively explore a richly structured environment. And this activity is not only necessary for the pickup of information, but, as we have seen, also creates it. Indeed, Gibson frequently asserted that information is not "imposed" but "obtained" (e.g., Gibson, 1979/1986, p. 243). In addition, many parts of the body are involved in the perceptual process. In Gibson's (1979/1986, p. 1) words:

> We are told that vision depends on the eye, which is connected to the brain. I shall suggest that natural vision depends on the eyes in the head on a body supported by the ground, the brain being only the central organ of a complete visual system.

Hence, visual perception is not a process that takes place in the eyes and the brain; rather in seeing, we move our eyes, turn our head, move our trunk, and often change position in the environment by using our legs. And all these movements and anatomical parts involved play a crucial role in *visually perceiving* the environment.

Importantly, Gibson also stressed that the function of picking-up a pattern in the ambient array can typically be realized in multiple ways. In his book *The senses considered as perceptual systems*, Gibson (1966) drew heavily on Walls' (1942) impressive study on the evolution of eyes. Walls' research showed that in the process of evolution, different anatomical structures have evolved that perform the same function. For example, the compound eye of a fly is anatomically speaking completely different from the human chambered eye. Yet they can both detect optical flow patterns that are used in locomotion. Gibson took this as an argument for defining optical information independently of the anatomical structures (e.g., a retinal pattern). "The eyes are different in different species of animals but the natural stimulus for all animals is the optic array" (Gibson, 1961, p. 256).

Moreover, Gibson (1966, pp. 4–5; emphasis in original; see also Gibson, 1966, p. 264) suggested that the same piece of anatomy can serve different functions at different moments in time:

> The same incoming nerve fiber makes a different contribution to the pickup of information from one moment to the next. The pattern of the excited receptors is of no account; what counts is the external pattern that is temporarily occupied by excited receptors as the eyes roam over the world, or as the skin moves

> over an object. The individual sensory units have to function *vicariously*, to borrow a term from Lashley, a neuropsychologist.

Hence, there is not a one-to-one relation between structure and function, as many psychologists and neuroscientists had assumed for centuries (e.g., Müller, 1837–1840/1938; see Anderson [2014] for an overview). Rather, in line with the romantic scientists, Gibson argued that the function of an element depends on the context in which it functions at that moment in time. "The individual nerve or neuron changes function completely when incorporated in a different system or subsystem" (Gibson, 1966, p. 56). This entails that decomposing is a misguided strategy to understand the functioning of a system. One first has to understand the whole organism in its environment before one can turn to a meaningful study of the parts. After all, the whole determines the functioning of the parts.

Toward an ecological psychology

Although Gibson was interested in many psychological phenomena, he worked mostly on perception. Yet the many ideas and concepts that he introduced in his ecological perspective on perception have profound implications for the whole of psychology. And Gibson was well aware of this. As his biographer (Reed, 1988, p. 319) put it:

> The painstaking series of steps he took in attempting to clarify the many puzzles of perception will ultimately produce a major rupture in the philosophical tradition that has grown up alongside Western science. And James Gibson will be eternally pleased to have upset that applecart.

Indeed, by arguing that the environment that animals live in does not consist of meaningless matter in motion but of meaningful affordances; that animals are not passive machines that are bombarded with stimuli, but are inherently active and hunt for ecological information; and that animals do not perceive a representation of the environment (that may or may not be correct) but the meaningful environment itself, Gibson replaced the mechanistic foundation of psychology with an ecological one. And, obviously, this significant change in starting point has serious implications for thinking about, among other things,

cognition, memory, imagination, navigation, social processes, motivation, emotion, communication, skillful coping, and the arts. Gibson only touched upon some of these implications in the years before his death, and much work still needs to be done to develop a genuine ecological psychology, but that it will result in a new psychology was abundantly clear to him. In the remainder of this chapter, I will discuss some of Gibson's thoughts on memory, imagination, culture, and the social. My intention is not to be exhaustive here but to show the significance of Gibson's ecological concepts for some psychological phenomena that will be discussed later in this book.

Perception, memory, and other modes of nonperceptual awareness

Gibson's theory of direct perception is often misunderstood as a nativist theory, one that holds that our perceptual capacities are given at birth, are hard-wired, and thus not sensitive to experiences (for a wonderful yet depressing article on how Gibson's theory is misunderstood, see Costall and Morris [2015]). Gibson by no means claimed this, and was actually arguing against nativism. Certainly, his view of how previous experience affects perception differs from the established cognitive view. Starting from the assumption that the stimulus is impoverished, cognitive theories typically hold that perceptual learning consists in improving the enrichment process that turns the stimulus into a percept, often by storing essential information that facilitates this process. Together with his wife, Gibson, however, developed a theory of perceptual learning as differentiation (Gibson & E.J. Gibson, 1955). In their view, perceivers do not improve by storing information; rather the perceiver learns to detect the more relevant information in the ambient array when she becomes more experienced and skillful. And by doing so, the world opens up to the perceiver—there is simply more to perceive. This means that the process of perceptual learning definitely depends on earlier experiences, but it is not the result of "the *storage* of past experiences" (Gibson, 1966, p. 262; emphasis in original) that enrich and attach meaning to the incoming, so-called 'stimuli'.

This is not to deny memory. In fact, Gibson conceived perception as one mode of cognition, and recognized many other modes. In the final years of his life, he went to great pains to distinguish perception, memory, expectation, imagination, hallucination, anticipation,

and dreaming (see Gibson, 1979/1986, p. 255; Reed, 1988, p. 299). And his newly developed theory of perception forced him to new perspectives on these phenomena. For example, in discussing the relationship between perception, memory, and expectation, Gibson (1966, p. 276) asserted:

> The ordinary assumption that memory applies to the past, perception to the present, and expectation to the future is […] based on analytic introspection. Actually, the three-way distinction could not even be confirmed, for the traveling moment of present time is certainly not a razor's edge, as James observed, and no one can say when perception leaves off and memory begins.

As we have seen, Gibson claimed that perceiving animals are generally active, and the information they pick up is typically a pattern over time. Indeed, among the things perceived are events, and these occur at different time scales. One can see something go in and out of sight, or the leaves of the trees dancing in the wind. But one can also perceive an annual cycle of growth and decay in one's garden, or see, over an even longer time scale, the climate change on planet Earth. As Gibson famously put it, "[a] special sense impression clearly ceases when the sensory excitation ends, but a perception does not. […] A perception, in fact, does not *have* an end. Perceiving goes on" (Gibson, 1979/1986, p. 253; emphasis in original). And this means that the boundaries between perception, memory, and expectation become fluid. In Gibson's (1975, p. 299) words:

> For where is the borderline between perceiving and remembering? Does perceiving go backward in time? For seconds? For minutes? For hours? When do percepts stop and begin to be memories or, in another way of putting it, go into storage? The facts of memory are supposed to be well understood but these questions cannot be answered. Equally embarrassing questions can be asked about expectation.

In developing his thoughts on the different modes of cognition (remembering, thinking, expecting, hallucinating), Gibson (1979/1986) argued that they should not be conceived "as an operation of the mind" (p. 255). Instead, by "reconsidering" them "in relation to

ecological perceiving they will begin to sort themselves out" (ibid.). Thus, Gibson defined remembering as "the recalling of anything that has gone out of existence"; guessing as "estimating or predicting without the extracting of an invariant"; and hallucinating as "the awareness of the imaginary without any reality testing" (quoted in Reed, 1988, p. 299). In fact, Gibson was convinced that his newly developed ecological account could solve some deep longstanding philosophical puzzles about how to distinguish perception from hallucination: If both hallucinating and perceiving take place in the head, and result in similar experiences, then how do I know whether the thing that I am experiencing right now is real and not something that I have made up in my head? Or as a more modern version goes: How do I know that I am not a mere brain in a vat that is hooked to a giant computer that electrically stimulates my nerves?

Gibson (1970, 1979/1986) argued that hallucinations and perceptions are distinguishable. The "test for reality" is not "intellectual" (Gibson, 1979/1986, p. 256), as many philosophers had assumed, but perceptual. Indeed, as Gibson (1970, pp. 425–426; emphases in original) explained in one of his *Leonardo* papers:

> An implication of this theory is that *a person can always tell the difference between a mental image and a percept when a perceptual system is active over time*. When the information for perception is obtained by the system […] a percept should *never* be confused with an image, since the activities of orienting, exploring and optimizing will always distinguish the two. […] [T]he essential difference between a memory image and a percept is […] that the image is not *explorable*, or *investigable* or *susceptible to increased clarity by sense-organ adjustment*.

Although Gibson (1979/1986) developed some initial ideas of how imagination takes place ("the visual system visualizes" [p. 256]), in my view, his reconceptualization of the so-called cognitive phenomena is more important. By providing ecological definitions of remembering, dreaming, imagining, guessing, hallucinating, and so on, he sharpened the explanandum of his new psychology.

Social phenomena and the cultural environment

From the beginning of his academic career, Gibson was interested in social psychology and the more political dimensions of his discipline

(Reed, 1988). He taught social psychology at Smith college and wrote a couple of interesting papers in the 1950s on social phenomena and perception. Although at that time Gibson made room for his theory of direct perception by distinguishing literal from schematic perception (see Costall, 1995; Reed, 1988), in his final years he argued that social perception is also direct and based on affordances. In the chapter on affordances in his final book, Gibson (1979/1986) argued that, "[t]he richest and most elaborate affordances of the environment are provided by other animals and, for us, other people" (p. 135). Other people afford talking to, having dinner with, playing chess with, having an argument with, and so on. According to Gibson (1979/1986, p. 135; emphasis added), the concept of affordances can be foundational for the whole of social sciences:

> *Behavior affords behavior, and the whole subject matter of psychology and of the social sciences can be thought of as an elaboration of this basic fact*. Sexual behavior, nurturing behavior, fighting behavior, cooperative behavior, economic behavior, political behavior—all depend on the perceiving of what another person or other persons afford, or sometimes on the misperceiving of it.

Although Gibson (1979/1986) admitted that the perception of the affordances of other people is "complex", he asserted that "it is based on the pickup of the information in touch, sound, odor, taste, and ambient light" (p. 135). When discussing the different senses, Gibson (1966) wrote, for example, about social touch, emphasizing how important it is for social life—indeed, it "is a requirement for the development of a mental life" (p. 132). Interestingly, to back-up the idea that the perception of softness is crucial for the young, Gibson (1966) referred to Harlow's (1958) classic study on what kind of mother substitute infant monkeys prefer in different situations. The experiments provided compelling evidence that the infant monkeys preferred to cling to soft "cloth mothers" rather than to rigid "wire mothers", even though the latter were lactating whereas the former were not (Harlow, 1958).

There are two other points that Gibson made about the social that are worth mentioning in the context of this book. First, Gibson recognized that we are social beings, root and branch. Already in the 1950s, Gibson argued that, "[s]ocial learning is inevitably moral, in an elementary sense of the term, and it is probably a mistake first to construct a behavior theory without reference to social interaction, and then to attach it only at the end" (Gibson, 1950a, p. 155). That is, the

social and the moral is not something that is added on top—we are not first and foremost individuals; rather, we are social beings at root. Although Gibson stated that children will first perceive the affordances for their own behavior, he proposed that they quickly learn to discover the affordances for others, initiating the socializing process. "Only when each child perceives the values of things for others as well as for herself does she begin to be socialized" (Gibson, 1979/1986, p. 141).

Second, Gibson stressed that the environment we live in is seriously altered by our (group) activities, a phenomenon that is now known as niche construction (e.g., Odling-Smee, Laland, & Feldman, 2003; see also Heft, 2007). Gibson mentioned the built environment, the construction of tools and how we use them, how our activity altered the natural deserts, mountains, and forests, and also the devastating effects our actions have on the quality of the air and the oceans. However, Gibson was quick to point out that the artificial, the cultural, and the natural should not be conceived as different environments. Indeed, there is just one environment that we live in. After discussing our modification of the environment, Gibson (1979/1986, p. 130; emphasis in original) claimed:

> This is not a *new* environment—an artificial environment distinct from the natural environment—but the same old environment modified by man. It is a mistake to separate the natural from the artificial as if there were two environments; artifacts have to be manufactured from natural substances. It is also a mistake to separate the cultural environment from the natural environment, as if there were a world of mental products distinct from the world of material products. There is only one world, however diverse, and all animals live in it, although we human animals have altered it to suit ourselves.

Hence, not only our behavior is inherently social, so is our environment. It consists of buildings, trains, mailboxes, tables, chairs, and other artifacts that all serve a particular role in our social practices. "[T]he real postbox (the *only* one) affords letter-mailing to a letter-writing human in a community with a postal system" (Gibson, 1979/1986, p. 139; emphasis in original). That is, the socially meaningful postbox is *in* the human environment, not in the mental theater.

An unfinished program

For decades, Gibson's ecological approach has been considered to be "the only *worked-out* naturalistic theory of perception" (Meijsing, 1998, p. 89; emphasis added), one that treats perception as an evolving biological function that serves the animals' adaptive behavior in the environment. Indeed, his ecological framework has proven to successfully guide a theoretical and empirical research program on perception and action (e.g., Lee, 1976; Michaels & De Vries, 1998; Turvey, 2019; Turvey & Carello, 1995; Warren, 1984). Unfortunately, during his life, Gibson did not succeed in developing his ecological approach to perception into a full-fledged alternative *psychology*. As we have seen, in the final years of his life, he set out some of the implications of his theory of perception for other psychological phenomena, but these ideas were far from matured—they were often more like hints. Yet, they revealed "new vistas for psychology" (Reed, 1988, p. 296).

As mentioned in the introduction of this book, several psychologists, anthropologists, and philosophers have tried to further Gibson's program after his death. And I think it is fair to conclude that serious progress has been made—we now have relatively detailed ecological accounts of numerous phenomena, varying from tool use and language to development, the arts, and the social (e.g., Bril et al., 2010; Costall, 1997; Heft, 2001; Hodges & Fowler, 2015; Ingold, 2000; Rietveld & Kiverstein, 2014). In his endorsement on the back cover of Reed's (1996a) *Encountering the world*, Neisser even claimed that "Reed offers a radically new approach to psychology as a whole—a genuinely ecological alternative to the reductionist paradigms so popular today". But obviously there is still significant work to do. In the remainder of this book, I aim to further the ecological approach by focusing on an aspect that has not been centralized yet in the ecological movement, but that is, I will argue, crucial in understanding our lives: Our inherently affective relationship with the environment.

3

AFFORDANCES, INVITATIONS, AND EMOTIONS

Now that I have laid out Gibson's program and the mechanistic tradition at which he took aim, it is time to develop an ecological account of our affective relationship with the environment. As I have mentioned in the introduction, we, and other animals, are always affectively engaged with the environment. There is no neutral, affect-free perception, action, cognition, development, and so on. Taking this phenomenological insight as my point of departure, I will discuss in this chapter the relationship between affordances, invitations, and emotions. And by doing so, I aim to sketch an ecological account of emotions. Crucially, I will not deal with specific emotions; rather, I try to develop a general ecological framework that can guide further theoretical and empirical work on our emotional engagement with the environment.

I will start this chapter with explaining why Gibson sidelined affectivity in his approach. To that end, we have to understand his ambivalent relationship with Gestalt psychology. Although Gibson was deeply inspired by Gestalt psychologists, he was rather critical of their idea that the environment has a demand character that solicits emotional responses. Examining this discussion helps us to understand where Gestalt psychology goes astray but also reveals what is missing in Gibson's own perspective. Then I turn briefly to Heidegger's phenomenology to show that we are always affectively engaged with the environment. Things matter to us. Hence, as several ecologically

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inclined authors have argued over the last decade, the environment is not a manifold of *possibilities for action*, but consists of invitations. I will end this chapter by arguing that Dewey's theory of emotions is a natural ally of this idea of invitations—it conceives an emotion as "one organic pulse" (Dewey, 1895, p. 21) that is directed at the environment. Hence, this conception allows us to defeat the traditional idea that emotions reside in the brain and can be expressed by means of the body.

Gibson's critique of Gestalt psychology

In the preface of his final book, Gibson (1979/1986) expressed his "debt to the Gestalt psychologists, especially to Kurt Koffka" (p. xiii). Gibson was keen on Koffka's focus on "molar behavior", his rejection of stimulus–response psychology, his critique of the concept of reflex, and the systems thinking he was moving toward. When Koffka discussed the notion of reflex arc and claimed that it cannot account for the accommodation of the eye's lens, Gibson (1971, p. 5) applauded:

> The reflex theory will not work. The action of the lens is an adjustment of a system, not a response to a stimulus. Blur of the retinal image is not a stimulus but a state. What the system does is to 'hunt', seeking an equilibrium, or what Koffka called a 'maximum property'. […] In 1935, this was an idea ahead of its time. To say that the focusing of a lens is a process that enhances the pickup of the texture or fine structure of an optic array is only a step from this.

Moreover, Gibson believed that Koffka rightly posed the question of perception, "[w]hy do things look as they do?" (Gibson, 1971, p. 4; 1979/1986, p. 1). However, he disagreed with Koffka's (1935/1999) answer—"things look as they do because of the field organization to which the proximal stimulus distribution gives rise" (p. 98). Rooted in the Kantian tradition, Gestalt psychologists claimed that internal forces organize the incoming stimuli, giving rise to meaningful perceptual experiences. In his *Principles of Gestalt Psychology*, Koffka (1935/1999) spent about 200 pages explaining the organizing forces that were, by then, discovered by him and his colleagues. However, and as we have seen in Chapter 2, Gibson did not have recourse to organizational processes in the brain when explaining perception. When

attending one of Koffka's lectures in 1930, Gibson complained: "[F]orces, forces, forces, crazy over… (the song of the Gestalt)" (quoted in Reed, 1988, p. 36). In his view, Gestalt psychology never succeeded in going beyond the traditional perception theory that is based on a mind–world dualism (e.g., Gibson, 1979/1986, p. 140).

Gibson's critique of this dualism is arguably most fully articulated when he discussed the concepts of behavioral and geographical environment. Koffka (1935/1999, pp. 27–28) introduced these concepts after discussing a German legend:

> On a winter evening amidst a driving snowstorm a man on horseback arrived at an inn, happy to have reached a shelter after hours of riding over the wind-swept plain on which the blanket of snow had covered all paths and landmarks. The landlord who came to the door viewed the stranger with surprise and asked him whence he came. The man pointed in the direction straight away from the inn, whereupon the landlord, in a tone of awe and wonder, said: 'Do you know that you have ridden across the Lake of Constance?' At which the rider dropped stone dead at his feet.

According to Koffka, this legend illustrates that a distinction should be made between the geographical environment (Lake Constance in this case) and the behavioral environment ("an ordinary snow-swept plain" [Koffka, 1935/1999, p. 28]). Geographically speaking, the rider traversed the lake, but his behavior was "a riding-over-a-plain" (ibid.). After all, the "behavior would have been just the same had the man ridden across a barren plain" (ibid.).

Gibson (1971) was convinced that this distinction between the geographical and the behavioral environment was problematic as it leads to philosophical "difficulties" (p. 7)—"muddle and confusion" (ibid.) could not be avoided. On my reading, Koffka's position is indeed equivocal. Although Koffka (1935/1999) claimed that the behavioral environment mediates "between geographical environment and behavior" (p. 36) and he situated it *within* the "real organism" in his schematic depiction of the animal–environment relationship (p 40), he nevertheless asserted that consciousness (which includes the behavioral field) should *not* be considered "as something *within* the animal" (p. 35; emphasis in original), a claim that is inconsistent with his overall theory of perception. As we have seen in Chapter 2, Gibson did not

make a distinction between the phenomenal world and the animal's environment. Hence, when discussing the above German legend, he asserted that the rider's behavior did not take place in the phenomenal or behavioral environment; rather, "the rider *over the lake* simply *misperceived* his environment" (Gibson, 1971, p. 7; emphases added).

Although I believe that Gibson was right when it comes to his critique of the untenable dualism in which Gestalt psychology is rooted, his rejection of the invitational nature of the environment is in my view misguided. Both Koffka and Lewin had stressed that objects in the environment can be endowed with a demand character. This idea was introduced by Lewin (1926/1999, p. 95; emphases in original), although his term *Aufforderungscharakter* has often been translated as valences (see Gibson, 1979/1986; Lambie, 2020):

> [I]t is common knowledge that the objects and events of the environment are not neutral toward us in our role of *acting* beings. Not only does their very nature facilitate or obstruct our actions to varying degrees, but we also encounter many objects and events which face us with a will of their own: *They challenge us to certain activities.*

Crucially, although Lewin (1926/1999, 1938) emphasized that objects and events can be characterized as negative and positive valences (things to retreat from versus things to approach), it is a "crucial feature of valences" (1926/1999, p. 95) that they invite *specific* actions. As Lewin (1926/1999, p. 95; emphasis in original) put it:

> It is much more characteristic for valences that they press toward definite *actions,* the range of which may be narrow or broad, and that these actions may be a great variety even within the group of positive valences. The book entices reading, the cake to eating, the ocean to swimming, the mirror to looking, confused situations to decisive action.

Later Koffka (1935/1999) also stressed this point when he famously claimed, "a fruit says, 'Eat me'; water says, 'Drink me'; thunder says, 'Fear me', and woman says, 'Love me'" (p. 7). Importantly, both Koffka and Lewin argued that this demand character is part of the phenomenal or behavioral world that changes as the need or the intention of the actor (in Koffka's terminology the Ego) changes. As Koffka (1935/

1999) put it, "I have a need which for the moment cannot be satisfied; then an object appears in my field which may serve to relieve that tension, and then this object becomes *endowed with a demand character*" (p. 354; emphasis added). Hence, when the child is tired the stairs do not invite climbing anymore, and the exquisite cake loses its soliciting character when we are full.

Although Gibson (1979/1986, pp. 138–140) acknowledged that his concept of affordances was based on this line of theorizing, he severely criticized it. In his review of Koffka's magnum opus, Gibson (1971, p. 8; emphases added) asserted:

> The [Gestalt] theory did not acknowledge the *independent reality of values*. The affordances of things turned out to be, in the last analysis, *subjective*. The fact that a fruit is edible, that water is drinkable, that thunder is fearsome and even that woman is lovable, was never given its due by Koffka. Perhaps if we acknowledge this fact at the outset, the fact that physiognomic qualities are just as real as material qualities, we shall have a better basis for theorizing.

Gibson had a severe tendency to objectify the environment. Although he acknowledged that we have needs and desires, and admitted that they can give rise to a "'coloring' of experience" (Gibson, 1972/2020, p. 410), he sidelined them when working on his conception of the *ecological* environment. Indeed, Gibson stressed that the affordances are permanent properties of the environment that exist independently of needs, desires, and concerns. The fruit is still edible even if you are not hungry. Hence, in Gibson's framework, the environment is conceived as a manifold of *possibilities* the agent can choose from.

Although I think that Gibson was right in arguing that the Gestalt psychologists "could not resolve the subject-object dichotomy" (Gibson, 1972/2020, p. 410), his replacement of the concept of demand character with his conception of affordances as possibilities was, I believe, not a step forward. The environment that we perceive and live in is not best characterized as a manifold of *opportunities for action* that we (intentionally or unintentionally) select. Rather, we are affective beings that are moved by our environment—the world does something to us. As Ratcliffe (2015, p. 61) once put it in a critique of Gibson's conception of the environment:

> Things do not simply 'afford' activities; they appear significant to us in all sorts of different ways. It is not helpful to say that a bull affords running away from, while a cream cake affords eating. What is needed […] are distinctions between the many ways in which things appear significant to us and, in some cases, solicit activity.

That is, we need a concept of demand characters or invitations, but one in which they do not reside in an inner mental world, but in the animal-relative environment. In this chapter I will argue for such a conception. But before I do so, I will first turn to phenomenology to highlight that we, and other animals, are affective beings, root and branch.

Animals are always affectively engaged with the environment

Over the last decades, several authors (e.g., Colombetti, 2014; De Haan, 2020; Hatzimoysis, 2009; Ratcliffe, 2015; Slaby, 2017) have stressed that we are always affectively engaged with the environment. Many of them have drawn in various ways upon Heidegger to make this claim. This German phenomenologist not only emphasized our inherently affective relationship with the world, but also forcefully articulated that this condition is foundational to our lives.

Previously, Heidegger's work has been used by several ecologically inclined authors (e.g., Kadar & Effken, 1994; Käufer & Chemero, 2015; Van Dijk, 2016b). They have shown that there are parallels between Gibson and Heidegger in their fundamental critique of the Cartesian tradition. Indeed, Heidegger predated Gibson in questioning the idea that our relation with the world is one of a conscious subject and an independent object, a relation that is mediated by mental content. Both Gibson and Heidegger stressed that we relate to the world in our practical engagement with it. However, unlike Gibson, Heidegger stressed that this engagement presupposes *Befindlichkeit*. In his insightful commentary on Heidegger's magnum opus, Dreyfus (1991, p. 168; emphasis in original) translated this as "affectedness" (but see Heidegger, 1927/1962), and he quoted Heidegger to illustrate how pivotal it was for the German philosopher:

> To be affected by the unserviceable, resistant, or threatening character of that which is available, becomes ontologically possible

> only in so far as being-in as such has been determined existentially beforehand in such a manner that what it encounters within-the-world can '*matter*' to it in this way. The fact that this sort of thing can 'matter' to it is grounded in one's affectedness; and as affectedness it has already disclosed the world—as something by which it can be threatened, for instance […] (Heidegger, 1927/1962, [137]).

Hence, in Heidegger's thinking affectedness is not a short-lived emotional episode with a clear beginning and an end, but is an essential feature of being-in-the-world that is a prerequisite for such emotions. Indeed, the affectedness and *Stimmung*, which Dreyfus (1991, p. 169) translated as mood, determine how the *world shows itself to us*. But, as Dreyfus (1991) was quick to point out, in Heidegger's thinking these moods should not be conceived as private feelings that color the world. And he (Dreyfus, 1991, p. 172; emphasis by Dreyfus) pointed to the following quote from Heidegger's *Being and time*:

> A mood is not related to the psychical […] and it is not itself an *inner condition* which then reaches forth in an enigmatical way and puts its mark on things and persons […]. It comes neither from 'outside' nor from 'inside', but arises out of the being-in-the-world, as a way of such being (Heidegger, 1927/1962, [137, 136]).

Indeed, "[moods] must be understood as specifications of a dimension of existence, i.e., of affectedness as a way of being-in-the world" (Dreyfus, 1991, p. 172). And, crucially, these are often not private but public. For example, cultures have "longstanding sensibilities" (ibid.), meaning that the same thing can show up in different ways in different cultures. What can invite a celebration in one culture, can prompt a fear reaction in another.

However, what is most important for the present purposes, is Heidegger's insight that affectedness and moods permeate our being. As Dreyfus (1991, p. 175) summarized it:

> Things are always encountered in some specific way, as attractive, threatening, interesting, boring, frustrating, etc. Possible actions are always enticing, frightening, intriguing, etc. We care when a

> piece of equipment breaks down and whether or not we achieve our goals. Affectedness is the condition of the possibility of specific things showing up as mattering.

In other words, we are not simply *in* the world as many Gibsonian psychologists have asserted, but always relate to it in one way or another—the world matters to us, it moves us in a variety of ways. And this fundamental characteristic needs to be incorporated into an ecological psychology worth the name.

Heidegger's ideas have been taken seriously in several philosophical accounts of emotions. Ratcliffe (2015), for example, discussed the importance of Heidegger's concept of moods in his philosophical account of depression, but also highlighted some shortcomings in Heidegger's thinking, including a focus on just a few emotional states. And although Colombetti (2014) criticized the fact that Heidegger did not give the body its due in his conception of affectedness (see also Ratcliffe, 2015), she recently expanded this conception with her notion of "primordial affectivity". In her view, *all living systems* are affective and this makes them animate. Colombetti was quick to point out that this does not mean that all living beings are in intense emotional states. Like Heidegger, she defended a broader and deeper notion of affectivity that is distinct from but foundational to emotions. Indeed, in her view, affectivity is the organisms' capacity of "being sensitive to what matters to them" (p. 2), and this is an essential feature of having a mind.

Early illustrations of this primordial affectivity can be found in the works of the American biologist Jennings. After studying unicellular organisms, metazoa, and lower animals, Jennings (1906, pp. 338–339) concluded that:

> The organism moves and reacts in ways that are advantageous to it. If it gets into hot water, it takes measures to get out again, and the same is true if it gets into excessively cold water. If it enters an injurious chemical solution, it at once changes its behavior and escapes. If it lacks material for its metabolic processes, it sets in operation movements which secure such material. If it lacks oxygen for respiration, it moves to a region where oxygen is found. If it is injured, it flees to safer regions. In enumerable details it does those things that are good for it.

Hence, all living beings are affectively engaged with their environments—things matter to them as their adaptive behavior clearly indicates. And in the Gibsonian psychology that I will lay out in the remainder of this book, I take this insight as my starting point.

The concept of inviting affordances

To capture affectivity, several ecologically inspired thinkers (e.g., De Haan, 2020; De Haan, Rietveld, Stokhof, & Denys, 2013; Dings, 2018, 2021; Heft, 2010; Käufer & Chemero, 2015; Rietveld, 2008; Rietveld & Kiverstein, 2014; Withagen et al., 2012) have recently argued for a reconceptualization of affordances. They argued that affordances are not mere possibilities for action (as Gibson had suggested), but can also invite us (for an early hint at this, see Costall [1995, p. 476]). In making this claim, many of these authors drew on a paper by Dreyfus and Kelly (2007). These phenomenologists argued that when affordances are experienced they do not show up as possibilities but as invitations. And in developing this idea they took inspiration from Gestalt psychology, fully aware of Gibson's critique of it (Dreyfus & Kelly, 2007, p. 52, footnote 3). In Dreyfus and Kelly's (2007, p. 52; emphases in original) words:

> We use the Gestaltist's term 'solicits' to refer to a datum of phenomenology. To say that the world solicits a certain activity is to say that the agent *feels immediately drawn* to act a certain way. This is different from *deciding* to perform the activity, since in *feeling immediately drawn* to do something the subject experiences no act of the will. Rather, he experiences the environment *calling for* a certain way of acting, and finds himself responding to the solicitation.

Importantly, Dreyfus and Kelly (2007) stressed that our primary mode is one in which we are "giving in to" (p. 52) the environmental demands. Granted, one can make decisions: One can, for example, reflect on what to do with a sabbatical next year, or decide not to eat the delicate chocolate cake despite the strong appeal it has. But as Dreyfus and Kelly (2007, p. 52) asserted, most of the time we simply respond to the invitations in the environment:

> In backing away from the 'close talker', in stepping skillfully over the obstacle, in reaching 'automatically' for the proffered

> handshake, we find ourselves acting in definite ways without ever having decided to do so. In responding to the environment this way we feel ourselves giving in to its demands.

Note how this idea befits the conception of affectedness that I have laid out in the previous section. Things, animals, persons, and events matter to us, they move us, and we unreflectively respond to their call.

Together with some colleagues, I aimed to further this idea by drawing not only on these phenomenological insights but on architecture and art as well (Withagen et al., 2012). Indeed, with their designs, architects and artists create not simply possibilities for action but invitations (see also Beek & De Wit, 1993; Rietveld, 2016; Rietveld & Rietveld, 2011). After criticizing the exclusive focus on aesthetics in architecture, Hertzberger (1991, p. 174) argued:

> The point is that whatever you do, wherever and however you organize space, it will inevitably have some degree of influence on the situation of people. Architecture, indeed, everything that is built, cannot help playing some kind of role in the lives of the people who use it, and it is the architect's main task, whether he likes it or not, to see to it that everything he makes is adequate for all those situations. It is not only a matter of efficacy in the sense of whether it is practical or not, but also of whether what we design is properly attuned to normal relations between people and whether or not it affirms the equality of all people.

Among other notions, Hertzberger (1991) introduced the concept of "inviting forms" to capture a characteristic of the built environment. Indeed, many objects are designed with a specific function in mind, and accordingly suggest a certain action. "Objects that present themselves explicitly and exclusively for a specific purpose—e.g., for sitting on—*appear to be unsuitable for other purposes*" (Hertzberger, 1991, p. 177; emphasis added). As a result, these objects are generally used in a single way, despite the myriad of possibilities for action they provide. To counteract this inflexible use of built structures, Hertzberger encouraged his students to design more neutral forms that invite a variety of actions. An example of such a structure is a wide and low balustrade that Hertzberger created in some student housing in Amsterdam in the 1960s. This balustrade was used by the residents to place a foot on while standing, to sit on while having a conversation with someone, and even served as a dining table during a joint Christmas meal.

Hertzberger's (1991) book *Lessons for students in architecture* contains many examples of how the built environment constrains and invites us. An architect creates places that always have a certain feel—that are pleasurable, safe, friendly, include or sometimes exclude people (see also Bachelard, 1958/1994; Withagen & Costall, in press). And this feel is also user dependent. Hertzberger discussed, for example, the appropriate size and form of a sandpit. Toddlers, he claimed, like to play in small groups, and feel more attracted to smaller places than to bigger ones. Hence, although a large sandpit affords building sand castles for them, they are more likely to do so when they all have their own little sandpit. This insight inspired Hertzberger to build small walls in a larger sandpit, creating small spaces that invite the toddlers to play with sand, either alone or in a small group.

Over the last few years, together with colleagues and students, I have tried to empirically study inviting affordances along these lines. We did do so by observing the spontaneous behavior that occurred in specific environments. And sometimes we could manipulate the environment ourselves to examine the behavioral effects of our 'architectural interventions'. For example, inspired by the "galaxy of playgrounds" that were designed by Aldo Van Eyck in the second half of the previous century (Lefaivre & Tzonis, 1999, p. 77; see also Withagen & Caljouw, 2017), we studied which jumping stone configurations children like best (e.g., Jongeneel, Withagen, & Zaal, 2015; Sporrel, Caljouw, & Withagen, 2017). Are children attracted to gap widths that are challenging for them? To what extent does the aesthetics of the configuration matter? Are children attracted to configurations that they found beautiful? Or is aesthetic appeal not of overriding importance for children playing? With these first studies, we have made some small steps in understanding when affordances invite children.

However, for now the progress that is made in conceptualizing invitations is more important. As argued by several authors, it is crucial to distinguish affordances and invitations (e.g., Bruineberg & Rietveld, 2014; De Haan, 2020; Käufer & Chemero, 2015; Rietveld & Kiverstein, 2014; Withagen et al., 2012). As Käufer and Chemero (2015, p. 165) put it:

> At any moment, there are infinitely many affordances available to a human or other animal. While sitting in a lecture, you could stand on a chair or on the table, you could write on the board or on the walls, you could sing show tunes, you could pull the

> hair of the person seated next to you, and on and on. These affordances are available to you, but none of them seem like live options for your next actions. These are all things that are afforded to you, but none of them invite action.

To capture the difference between affordances and invitations, De Haan et al. (2013) made a distinction between the landscape of affordances and the field of affordances (see also De Haan, Rietveld, Stokhof, & Denys, 2015). The landscape consists of all the affordances that are available to certain animals. So for the person in the above quote they include the affordances of writing on the wall, and pulling the hair of your neighbor. The field of affordances, on the other hand, consists of the soliciting affordances for a certain individual at a specific setting. De Haan (2020) distinguished three dimensions in this field (see Figure 3.1). The width of the field (i.e., the number of bars) refers to the (relevant) affordances that an animal perceives. Some people are truly open to the world and perceive many possibilities for action, others have a strong focus on a few affordances that are important to them. The height of the bars represents the degree of invitation. Some affordances almost prompt a certain action, whereas others have a lesser degree of invitation. And importantly there is a temporal dimension as well, which is captured by the depth of the field. As De Haan (2020, p. 220) put it in her recent book:

> One not only perceives the affordances that are immediately present here and now, but one is also pre-reflectively aware of

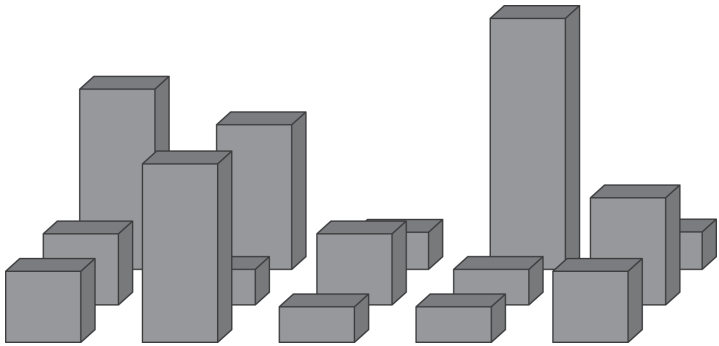

FIGURE 3.1 A field of affordances. (From figure 1, De Haan et al., 2015, Creative Commons Attribution License applies.)

> future plans and possible actions. These are the affordances on the horizon that one is in a sense already responsive to. Besides, one's present field is always shaped by one's history of previous interactions: after eating the chocolate, I'm no longer distracted by being hungry and my goal of finishing my book now makes my computer stand out more forcefully.

Note that affordances have a different ontological status from invitations. Affordances are relatively permanent features of the animal-relative environment that do not depend on being perceived. Water still affords drinking for me even if I do not pay attention to that affordance at this particular moment in time. Invitations, on the other hand, are contingent on perception. An affordance can only press toward a certain action if it is perceived (Withagen et al., 2012). This means that invitations are animal-relative in a different way than affordances are. Moreover, generally speaking, they seem to be more dynamic than affordances. The drinkability of water solicits an action for me only at several moments during the day.

When do affordances invite?

Although the idea of inviting affordances is gaining momentum in ecological psychology and beyond, it has also received some criticism over the last few years. For example, in his book *The philosophy of affordances*, Heras-Escribano (2019) stated, "[a]gainst Withagen et al. (2012), I claim that the inviting character of certain affordances does not exist; rather, it is nothing other than understanding those affordances with the social normative background as a reference" (p. 111). Among other things, Heras-Escribano commented upon our example that a chair is generally used in a single way, whereas the neutral plinth course that the architect Hertzberger had included in some of his buildings is often used in multiple ways (Withagen et al., 2012). Heras-Escribano (2019, p. 113) argued that this does not have to do with a special character of affordances (the invitational character) but can simply be accounted for in terms of social norms:

> [T]he invitational character says nothing about affordances themselves, but about the normative background through which we can understand their using. Affordances do not invite,

> as Withagen et al. (2012, p. 253) claim; rather, some norms force us to take them.

I think this critique misses the mark on two counts. First, I am completely on board with the primacy of social practices (and this obviously includes norms) in which affordances take part (Withagen et al., 2012). Also in recent empirical work on inviting affordances in children's playgrounds, we centralized this aspect (Van Der Schaaf, Caljouw, & Withagen, 2020; Van Der Schaaf, Jeschke, Caljouw, & Withagen, 2021; Withagen & Caljouw, 2017). Our social practices determine to a significant part how objects show themselves to us (e.g., Costall, 1995; Van Dijk & Rietveld, 2017). However, Heras-Escribano seems reluctant to accept the idea that affordances are experienced as invitations. In his view, that would result in a kind of subjectivism (Heras-Escribano, 2019, pp. 104–105). And defending a strict version of direct realism, Heras-Escribano does not want the environment to be perceived differently by different people—"[y]ou perceive the same as everyone, but you act differently given your social background" (Heras-Escribano, 2019, pp. 108–109). Besides the fact that I think that sticking to a such a version of direct realism has done more harm than good to the Gibsonian movement (see the Epilogue), it is important to realize that there is nothing spooky about claiming that an affordance solicits an action. It simply means that an affordance attracts an organism at a certain moment in time, a phenomenon that is best understood by taking the organism–environment system as a starting point (see Chapter 6).

Second, and also in response to Heras-Escribano (2019), it is important to stress that social norms cannot do all the work. Imagine a couple that goes on a bicycle trip through Sweden during their summer break. The woman loves dipping in cold water, but her husband cannot stand it. When they approach a little lake or the Baltic Sea, the woman is attracted to the cold water, stops cycling, puts on her bikini, dives in, and tells her husband that the water is so lovely. The man, on the other hand, puts his hat on, and takes the only novel he can carry on the trip from one of his rear panniers and starts reading. Both reading at a lake and swimming in it are socially acceptable behaviors to perform in such a setting. Hence, some other factors need to be drawn upon to explain why the woman was so eager to dive into the cold water. Or to give another example, in one

of their playground studies, Sporrel et al. (2017) installed two different jumping stone configurations in a public park. And when the children were free to play at these configurations, they had a preference for the higgledy-piggledy configuration over the neatly structured one. Although the fact that the children jumped from one stone to the other could be explained by referring to social norms (that is what jumping stones are *for*), the fact that one configuration attracted the children more than the other seems not contingent on those norms.

I think it is important to realize that at this point we are far from an understanding of when affordances are soliciting. The idea that they can invite is relatively new in the ecological approach, and we should not jump to conclusions at this stage. Käufer and Chemero (2015, pp. 202–203), for example, argued that ecological psychology alone is not capable of accounting for the invitational character of affordances, but when combined with dynamical systems thinking, this character can be explained:

> [I]magine a human engaged in a task, like building a bookcase. From the point of view of radical embodied cognitive science, that human, plus her tools, will comprise a self-organizing dynamical system engaged in a particular task. This means that the human-plus-tools engaged in this task will have endogenous dynamics, making it perturbable only by certain things. […] There are more or less infinitely many affordances available at any moment, but very few of them invite action. When the self-organized human-plus-tool system is engaged in building a bookcase, it can be perturbed only by task-relevant affordances. That is, the system will be responsive to the invitation at the tool bench, but not the mere affordances elsewhere in the room.

Although the theory of self-organization might be helpful in explaining when affordances invite, it seems unlikely to me that it provides the full story. For instance, in the above example it does not explain why the person is attracted to making a bookcase in the first place. Based on the studies thus far, we can of course draw *some* conclusions about when affordances invite. From our own empirical studies on jumping stones, we know, for example, that both children, young adults, and elderly like configurations with a variety of gap widths better than configurations with equal distances between the stones (Jongeneel et al., 2015; Jeschke, De Lange, Withagen, & Caljouw, 2020). Moreover,

we found that the users' action capabilities play important roles in whether a configuration solicits jumping for them. People from different age groups are generally attracted to configurations with gap widths that are close to their (estimated) maximum stepping distance (Jeschke et al., 2020). But, obviously, action capabilities alone cannot explain all invitations—they are simply one of the arguably many factors that jointly determine when an affordance solicits behavior (Withagen et al., 2012). As Jeuk (2019) put it, "embodied abilities do not constitute what matters to us—teaching a lecture does not matter to me, because I have the ability to do so, but because I have concern to do so" (p. 255). Following along these lines, Dings (2021) made a strong case for taking (diachronic) concerns into account in our theorizing about soliciting affordances. For example, whether a piece of food (e.g., pork) invites eating is not contingent solely on one's ability to eat and digest it (or on whether one is hungry or not), but depends on numerous concerns and convictions (e.g., religion, being a vegan/vegetarian or a meat eater, trying to reduce your carbon foot print, being on a diet to lose weight, and so forth). And in Chapter 4, I will make a plea for developmental history, showing how our childhood experiences determine the environment's invitations. Hence, all we can do at this stage, is setting up research programs in which we carefully study the multitude of factors that potentially play a role in determining when the environment solicits behavior. At this moment, any conclusion on how best to explain invitations is premature.

A complementary theory of emotions

The idea of inviting affordances naturally captures the phenomenological insight that animals, including humans, are always affectively engaged with the environment. The world does something to us, it moves us, it appears significant to us. But what theory of emotions is the natural ally of this concept of soliciting affordances? Over the last centuries many (conflicting) theories of emotions have been introduced (for overviews see Lambie & Marcel, 2002; Prinz, 2004). However, and as mentioned in Chapter 1, ever since the cognitive revolution in psychology, the dominant theories have held that emotions are the result of an appraisal of a stimulus (e.g., Arnold, 1960; Lazarus, 1966). Yet, advocates of these appraisal theories vary slightly in how they conceptualized emotions. For example, Arnold (1960), Lazarus (1991), and Frijda (2007/2013) all listed several and

sometimes different features that make up the emotion. However, they all mentioned action tendencies, a "readiness to find and execute some action that can do something with or about the event and its affective value" (Frijda, 2016, p. 614).

Interestingly, Frijda's concept of action readiness has been adopted by some ecologically motivated philosophers (e.g., Rietveld, 2008; Rietveld & Kiverstein, 2014). They argued that this concept captures the action-oriented aspects of emotions and, thus, might complement the idea of inviting affordances. However, Rietveld and Kiverstein (2014) did not adopt Frijda's overall theoretical framework, and with good reason. After all, this perspective, like other appraisal theories, is highly inconsistent with the central Gibsonian tenets. First, appraisal theories run counter to Gibson's theory of direct perception. The former assumes a meaningless world in which meaning is added in a mental process; the latter, by contrast, states that the world is meaningful and that this meaning can be perceived directly. Second, many appraisal theorists assume that the emotion is a state that exists prior to and independently of a behavioral expression or response. And Frijda (2007/2013, p. 42) is no exception:

> Passion does not necessarily entail action, although it is difficult to conceive of instances of passion, as defined here, that do not translate into action. It is possible, though: a love that remains hidden, only felt, only manifest in frequent distraction.

Hence, this theory, as many other theories of emotion, assumes an *inner* psychological reality that some ecologically inclined thinkers (see e.g., Reed, 1996a; Van Dijk & Withagen, 2014) question. In line with Merleau-Ponty's insights, these authors argued that psychological phenomena like cognition and emotion are modes of behavior rather than mental states that can be *expressed* by means of the body. "Anger, shame, hate, and love […] are types of behavior or styles of conduct which are visible from the outside. They exist *on* this face or *in* those gestures, not hidden behind them" (Merleau-Ponty, 1948/1964, pp. 52–53; emphases in original).

At the end of the 19th century, Dewey developed a general theory of emotions that is more in line with the Gibsonian tenets and that befits the idea of inviting affordances. Although there is a renewed interest in Dewey's theory (e.g., Colombetti, 2014; Krueger, 2014; Lambie, 2020; Withagen, 2018), it has not received much attention

in the literature about emotions for decades. In their oft-cited paper, Lambie and Marcel (2002) did not discuss Dewey's work when portraying the seminal theories of emotions (but see Lambie, 2020). Also Prinz (2004) and Frijda (2007/2013) did not discuss Dewey's perspective in their influential books on emotions.

Dewey's view of emotions grew out of a response to both James' (1884) somatic theory of emotions and Darwin's (1872/1998) idea of the expressions of emotions. In 1884, James published his landmark paper on emotions in which he argued that emotions *are* bodily feelings. James was not very much impressed by the psychological studies of emotions at his time. As he (James, 1890/1950, p. 448) put it a couple of years after he had published his emotion paper:

> But as far as 'scientific psychology' of the emotions goes, I may have been surfeited by too much reading of the classic works on the subject, but I should as lief read verbal descriptions of the shapes of the rocks on a New Hampshire farm as toil through them again.

In James' view, the classics in psychology have focused too much on *classifying* emotions treating them as "absolutely individual things" (James, 1890/1950, p. 449), without getting to "deeper levels" (ibid.). Moreover, although accepted by mainstream psychology for centuries, the common-sense theory of emotions in which they are conceived as mental phenomena that precede the bodily expression has it completely backwards according to James. In his view, "*bodily changes follow directly the* perception *of the exciting fact, and that our feeling of the same changes as they occur* is *the emotion*" (James, 1884, pp. 189–190; emphases in original). That is, you do not tremble because you are afraid, but you are afraid because you tremble. James' (1884, pp. 193–194) main argument for his theory was as follows:

> If we fancy some strong emotion, and then try to abstract from our consciousness of it all the feelings of its characteristic bodily symptoms, we find we have nothing left behind, no 'mind-stuff' out of which the emotion can be constituted, and that a cold and neutral state of intellectual perception is all that remains. […] What kind of an emotion of fear would be left, if the feelings neither of quickened heart-beats nor of shallow breathing, neither of trembling lips nor of weakened

> limbs, neither of goose-flesh nor of visceral stirrings, were present, it is quite impossible to think.

By arguing that emotions originate in, or more precisely, *are* bodily feelings, James moved beyond mere description of the emotions, and laid out a general theory of their genesis.

Although Dewey was inspired by James' theory, he was critical of it. In his first paper on emotions, Dewey (1894) asserted that James seemed to be unaware of "the inconsistency of Darwin's principles" (p. 554). Although James was deeply influenced by Darwinian thinking in his overall psychology, his theory of emotions was indeed not compatible with Darwin's. After all, the latter holds that emotions are expressed, assuming that they exist antecedently to and independently of bodily responses (but see Darwin, 1872/1998, p. 234; see also Dewey, 1894, p. 554), whereas James stated that emotions *are* bodily feelings. In line with James, Dewey rejected this distinction between emotions and their expressions. "To an onlooker my angry movements are expressions—signs, indications; but surely not to me" (Dewey, 1894, p. 555). In Dewey's (1894, p. 555; emphasis in original) view, one falls into the psychological fallacy if one treats affective movements as expressions:

> [I]t is to confuse the standpoint of the observer and explainer with that of the fact observed. Movements *are,* as matter of fact, expressive, but they are also a great many other things. In themselves they are movements, acts, and must be treated as such if psychology is to take hold of them right end up.

Although Dewey was on board with James' (1890/1950) idea that "a purely disembodied emotion is a nonentity" (p. 452), he stressed the intentionality of emotions arguably more than James did (see also Lambie, 2020). In Dewey's (1895) view, emotions are not just bodily feelings, but modes of behavior that are "always 'about' or 'toward' something" (p. 17). They are generally directed at a certain object in the environment, and the object in question is an essential part of the emotion. As Dewey (1895, p. 17; emphasis in original) aptly put it:

> The child who ceases to be angry *at* something—were it only the floor at last—but who keeps up his kicking and screaming,

> has passed over in sheer spasm. It is then no more an emotion of anger than it is one of aesthetic appreciation.

Although Dewey's theory did not centralize the feeling of the emotion—it is more about "being sorry" than about "feeling sorry" (Dewey, 1895, p. 15)—he certainly made a place for it. In fact, he saw it as an inherent characteristic of a behavioral response. "[T]he mode of behavior, or coördination of activities, constitutes the ideal content of emotion just as much as it does the *Affect* or 'feel', and that the distinction of these two is not given in the experience itself" (Dewey, 1895, p. 24; emphasis in original).

Dewey's theory of emotions differs from the earlier discussed appraisal theory in several important respects. First, Dewey argued that an appraisal of a stimulus can be dispensed with, as the environment is already "colored with an affective quality" (Krueger, 2014, p. 142). As he (Dewey, 1934/2005, p. 15) put it in a later publication:

> The live animal does not have to project emotions into the objects experienced. Nature is kind and hateful, bland and morose, irritating and comforting, long before she is mathematically qualified or even a congeries of 'secondary' qualities like colors and their shapes. Even such words as long and short, solid and hollow, still carry to all, but those who are intellectually specialized, a moral and emotional connotation.

Second, and relatedly, Dewey overturned the idea that an emotion is (one of) the final step(s) in a serial process. In fact, especially in his second paper on emotions, Dewey (1895) already laid out some of his critique of mechanistic psychology that he so forcefully articulated in his famous article on the reflex arc a year later—the mind is not "a mechanical conjunction of unallied processes" but a concrete "coördination" (Dewey, 1896, p. 358). Indeed, this idea of coordination figured prominently in his emotion papers. Dewey (1895) conceived an emotion as "one organic pulse" (p. 21) that is directed at the environment—a "*whole concrete coördination of eye—leg—heart, &c.*" (ibid., emphasis added). It does not consist of distinct psychological processes that form a sequential chain. One does not first perceive an object, attach meaning to it, giving rise to an emotion which might result in an action. In fact, perception even does not come first—the

significance of a 'stimulus' is largely determined by the activity one is already engaged in. As Dewey (1896, p. 361) put it in his paper on the reflex arc:

> If one is reading a book, if one is hunting, if one is watching in a dark place on a lonely night; if one is performing a chemical experiment, in each case, the noise has a very different psychical value; it is a different experience. In any case, what precedes the 'stimulus' is a whole act, a sensory-motor coördination. What is more to the point, the 'stimulus' emerges out of this coördination […]

In Dewey's theory of the concrete wholeness of emotion, any distinction between the object of emotion and the emotion itself becomes inconceivable—"the frightful object and the emotion of fear are two names for the same experience" (Dewey, 1895, p. 20). Hence, the object is frightful not prior to the emotion of fear; rather the frightful object is an integral part of the emotion (see also Colombetti, 2014). Granted, in reflection upon the behavior one can analytically separate the object and the emotion, but in experience they are one.

Note how Dewey's theory of emotions befits the Gibsonian ideas in general, and the concept of inviting affordances in particular. Indeed, it captures the intentionality and the bodily engagement with the environment that the concept of soliciting affordances implies (see also Van Dijk, 2021a). My nephew Guus running toward me solicits joyful playing with; my nice and cozy study entices to pleasant reading and writing; delicate Sencha tea from Japan solicits sipping and enjoying, and so do some wonderful Dutch beers and Italian wines. In all these examples, there is an affective bodily engagement with the environment's invitations. Hence, emotions are not mere bodily feelings (as James stressed), nor are they mental states at the end of a causal chain (as the appraisal theorists asserted), or states that are expressed by the body (as Darwin argued); rather they *are* direct organic responses of the animal to a concrete meaningful situation. Fear *is* a bodily response *directed at* a situation, one that solicits escaping from. In like fashion, emotions like anger, jealousy, joy, shame, pride, and so on, can be conceived as actions directed at meaningful and soliciting aspects of the animal's environment. And again, and as Dewey had stressed, all these actions are accompanied by a certain feeling.

The statement that all emotions are purposive modes of behavior is likely to meet with some disbelief. After all, emotions are commonly seen as *private* feelings, accessible mainly to the person who experiences them. As we have seen earlier, many appraisal theories of emotions conceptualize them as such. And also James, (1890/1950) who was willing to accept that all instincts have an affective component, argued that the class of emotions is larger than that of instincts. His (James, 1890/1950, p. 442; emphasis in original) main reason was that:

> Emotional reactions are often excited by objects with which we have no practical dealings. A ludicrous object, for example, or a beautiful object are not necessarily objects to which we *do* anything; we simply laugh, or stand in admiration, as the case may be.

However, I would consider this laughing and standing in admiration as behaviors directed at the environment too. And although I agree with James that these movements are more subtle than reactions of fear and anger, I disagree with him that they are "less practical" and "more internal" (p. 442). They, too, serve important roles in our social lives, and are "visible from the outside" as Merleau-Ponty (1948/1964, p. 52) put it.

Another, and related, objection might be that defining emotions as modes of behavior fails to do justice to the fact that we can also conceal an emotion. You are feeling sad, but you pretend that you are happy when your colleague asks you how you are doing. This seems to indicate that the emotion is indeed something inner. However, in my view this concealing your emotion is also as a mode of emotional behavior. And especially when you know someone well, you can tell whether that person is really happy or pretend it to be. So again, this is a mode of behavior that is visible. And although someone might not accurately perceive the other person's emotion, nothing is hidden behind the affective behavior. She is simply misperceiving it.

Toward an affective Gibsonian account

The above ecological framework is a departure from Gibson's perspective, and perhaps a significant one. As we have seen, Gibson had some good reasons for not accepting Koffka's theory that objects can

be endowed with a demand character. After all, Koffka's perspective was based on the problematic mind–world dualism: There is a 'real' geographical environment and an 'inner' phenomenal one in which the demand characters reside. However, Gibson's alternative conceptualization of the environment as consisting of possibilities for action (a conception that later ecological psychologists like Turvey and Reed followed) fails to capture the phenomenological insight that we are affective beings root and branch who experience the world as something that matters to us in a variety of ways. That is, Gibson's original perspective does not do justice to *the fact* that all animals are always affectively engaged with the environment. However, with the concept of invitations this aspect is naturally covered, especially when combined with Dewey's theory of emotions as modes of behavior that are directed at these invitations. Although the factors that determine when the environment invites behavior await to be discovered, the concept of invitations is suited to describe at least some of the ways "in which things appear significant to us" (Ratcliffe, 2015, p. 61). After all, it captures what the environment does to us, how it moves us in whatever way. And as I will argue in Chapter 6, applying a developmental systems perspective to the animal–environment system can explain both the invitations and the individual differences therein without introducing mental theaters and representations. Inner worlds can be dispensed with.

4

A PLEA FOR DEVELOPMENTAL HISTORY

In Chapter 3, I have discussed the relationship between invitations and Dewey's theory of emotion. We have seen that they form a natural pair—the environment solicits a certain emotional response that is, thus, directed at the environment. What always strikes me is that invitations are highly person dependent. For example, there are strong individual preferences for art and food, to name just two realms. Paul Klee's paintings have a serious appeal to several people, but others found them boring; the famous French sausage andouillette makes some salivate, but others almost vomit; and so on. Individual differences also clearly manifest themselves in social situations. An angry colleague calling you names might make some people scared, some angry, and leaves other people relatively untouched. These individual differences raise many interesting questions for the ecological perspective. Do they question the idea of direct perception? Do they imply that we are not always in touch with the environment's affordances?

In the remainder of this book, I aim to answer these questions. But before I do so, I will scrutinize the individual differences in our emotional responses in social interactions a little further. To that end, I will turn to the work of the clinical psychologist Alice Miller. She was trained as a psychoanalyst, but developed a perspective that is way more ecological than Freud's. Instead of focusing on frustrated fantasies, Miller centralized the real interactions of parents and children in her framework and demonstrated their lifelong effects. I believe that

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her insights can further our understanding of invitations and the individual differences therein. Hence, integrating the gist of her ideas with the ecological framework will strengthen the latter perspective.

In this chapter I will commence with a few words on the ecological approach to development. Although within this approach the needs of children are acknowledged, the consequences of not fulfilling those needs were not addressed. To fill this lacuna, Miller's work is of great help. I will limit myself to the very idea of her perspective—the many nuances of her framework will not be discussed. Moreover, I will not adopt the sometimes obscure psychoanalytic terminology she used, especially in the beginning of her career. After a portrayal of Miller's insights, I will focus on the work of Jenson. Jenson followed Miller in her overall framework but set out in more detail the emotional (i.e., behavioral) responses that we develop as a response to childhood injuries. However, to prepare their ideas for a neat integration into the ecological framework, Miller's psychology has to be cleansed of its representationalist terminology and thinking. I aim to do this at the end of this chapter.

Ecological approach to infant development

Starting in the 1950s, Eleanor Gibson devoted her career to studying how children learn to perceptually differentiate (see E.J. Gibson, 1969; E.J. Gibson & Pick, 2000). Many ecological psychologists have been inspired by her approach and developed it further, examining, among other things, the process of learning to perceive affordances (see e.g., Adolph, Eppler, & E.J. Gibson, 1993; Dent-Read & Zukow-Goldring, 1997; Goldfield, 1995; Szokolszky & Read, 2018). In fact, studying development is key to ecological psychology. As we have seen in previous chapters, ecological psychologists consider animals to be organisms—integrated wholes that *develop over time*. As Ingold (2007), following Bergson (1911/1998), once put it, "organisms do not so much *exist* as *occur*" (p. 117; emphases in original). Hence, starting from this contention, all psychology is or at least should be developmental psychology (see also Heft, 2018; Szokolszky & Read, 2018).

Among the aspects of development that have been studied by ecological psychologists is the parent–infant interaction (see e.g., Fantasia, Fasulo, Costall, & López, 2014; Radar & Zukow-Goldring, 2012). In his book *Encountering the world*, Reed (1996a) discussed the situation of the newborn trying to perceive the mother, showing how

the ecological approach differs significantly from the established perspectives. In Reed's (1996a, pp. 106–107) view, neither the nativists nor the empiricists have an adequate story to tell of what goes on at this significant moment in a baby's life:

> What is striking about both these positions is how far away they are from any factual grounding. Both positions assume that the key problem for the infant is the construction of meaningful experience out of meaningless inputs. But this problem does not seem to manifest itself when one studies what newborns do. […] Newborn humans act as if what they are seeing (and smelling and hearing and tasting) is already meaningful and as if they would like to get more information about it. […] [N]ewborns act just as one would expect if they are unfamiliar with what they are looking for. They do not act as if they have an idea of what these things are, and instead, to a remarkable degree for such unfinished creatures, they scrutinize the situation with great care.

The baby is not making associations or using inherited concepts to structure the incoming ambiguous stimuli as the empiricists or nativists would argue, respectively. Rather, the newborn is exploring the situation to perceive the meaning of the environment. Indeed, as we have seen in Chapter 2, the Gibsons argued that perceptual learning and development is a process of differentiation in which animals learn to rely on the relevant information through a process of exploration. And this applies to newborns in particular. As Gibson (1979/1986, p. 134; emphasis in original) put it:

> There is much evidence to show that the infant does not begin by first discriminating the qualities of objects and then learning the combinations of qualities that specify them. Phenomenal objects are *not* built up of qualities; it is the other way around. The affordance of an object is what the infant begins by noticing. The meaning is observed before the substance and surface, the color and form, are seen as such.

Building upon these insights, Reed sketched a view of how the child grows up in a "populated environment" (Reed, 1996a, p. 126; see also Costall, 1995), consisting of other people, animals, and objects, that

both structure and are structured by the child's developmental process. Indeed, development takes place not in the child's head, but in the animal–environment system (e.g., Dent-Read & Zukow-Goldring, 1997; E.J. Gibson & Pick, 2000; Szokolszky & Read, 2018). Although Reed acknowledged the fact that infants have needs, this aspect received relatively scant attention in his work. However, as I will argue below, the many needs of children (and the consequences of not fulfilling them) are important to understand not only the developmental process but also the individual differences in how the environment shows itself to us.

Miller's insights

A good starting point in that respect is the work of the clinical psychologist Alice Miller. Drawing on a trained psychoanalyst to further the Gibsonian perspective might seem strange to some ecological psychologists. However, there is a small tradition of integrating Freudian insights into ecological theorizing. Holt (1915) was keen on Freud, and wrote a book on his conception of wish, arguing that, "[Freud] has given us a key to the explanation of mind. It is the first key which psychology has ever had which fitted, and moreover I believe it is the only one that psychology will ever need" (pp. vi–vii). And also Gibson himself appreciated Freud's theorizing, especially in the beginning of his career. In one of his early papers on social psychology, Gibson (1950a) claimed that, "[c]oncepts borrowed or adapted from Freud, however, are indispensable for a theory of social learning because no psychologist has understood the role of the parents in forming the habits of the child as clearly as he" (p. 152). However, and as I will set out below, I believe that Miller's subsequent thinking is more consistent with the ecological tenets than Freud's. Although her framework has to be cleansed of a representational way of thinking as well, she, contrary to Freud, placed the history of real interactions between people central in her explanation of behavior. Indeed, she explicitly broke with Freud's drive theory that was centered around frustrated fantasies.

The breakaway from Freud's psychoanalysis

Miller was born in Poland in the winter of 1923. She studied literature and philosophy at the University of Warsaw, and later continued her

studies at the University of Basel. In the 1950s, she was trained as a psychoanalyst in the tradition of Freud and continued practicing it for about 20 years. When writing her first and landmark book *The drama of the gifted child* (first published in English as *Prisoners of childhood*), she believed that her view was "compatible with" Freud's perspective (Miller, 1981/1998, p. 51). However, based on a thorough analysis of her own experiences, she later came to realize that her perspective was at variance with Freud's approach. This resulted in a break with his theory and with the International Psychoanalytic Association as well.

Especially in her book *Thou shalt not be aware*, Miller (1981/1998) laid out a detailed critique of Freud's theory. What Miller mainly took aim at was his drive theory that holds that neuroses are the result of conflicts between (instinctive) drives. Interestingly, a serious part of Miller's book is focused on a shift in Freud's thinking that occurred at the end of the 19th century (see also Jones, 1953–1957/1977). In 1896, Freud wrote a paper *The Aetiology of Hysteria* in which he reported of an investigation of 18 patients (6 men and 12 women) who suffered from hysteria. After detailed psychoanalyses of these patients, Freud concluded that they all have been sexually abused by an older sibling, parent, or other adult. The discovery that hysteria was rooted in premature sexual experiences was thrilling for Freud. In his own words, "I believe that this is an important finding, the discovery of a *caput Nili* in psychopathology" (Freud, 1896/1978, p. 203; emphasis in original).

However, a year later, Freud revised his idea, and stated that children were not sexually abused, but had frustrated sexual desires instead. He came to believe that children between three and six years of age are in love with the parent of the opposite sex and developed a jealous hostility toward the parent of the same sex. Freud developed this idea into the theory of the Oedipus complex, which was introduced in his seminal book *The interpretation of dreams* (1900/2020). Because the desires of the child obviously could not be fulfilled, they had to be repressed, resulting in neuroses that manifest themselves later in life. Interestingly, in 1924, Freud wrote an addendum to his 1896 paper on hysteria, claiming that, "[a]ll this is true; but it must be remembered that at the time I wrote it I had not yet freed myself from my *overvaluation* of reality and my *low valuation* of phantasy" (Freud, 1896/1978, p. 204; quoted in Miller, 1981/1998, p. 41; emphases in original).

However, according to Miller, Freud changed his perspective not because of new insights or experiences with patients, but because the message of sexual abuse could not be easily stomached by society (see

also Masson, 1984)—in fact, it aroused serious resistance. In Miller's (1981/1998, pp. 145–146) words:

> It must have been Freud's unconscious dependence on this tradition that caused him to formulate the Oedipus complex, a theory that, in a new form, once again assigned all guilt to the child; this freed Freud from the painful isolation in which he found himself as a result of the discoveries he made in 1896 concerning parents' sexual abuse of their children. Shocking as people of that day found the idea of a child with sexual desires, this was still far more acceptable to the contemporary power structure, whose motives were disguised and buttressed by established methods of child-rearing, than was the whole truth about what adults do with their children, also in the area of sexuality.

Although Miller severely criticized Freud, she praised him as well for his method to get insight into the human mind (e.g., Miller, 1981/1998, p. 51). Moreover, she followed Freud in the contention that neuroses (and other emotional struggles) originate in childhood, that infants have sexual experiences, and that we all have an unconscious in which repressed feelings are buried but that significantly influence our everyday behavior. However, contrary to Freud, and in line with some other dissenting psychoanalysts (e.g., Bowlby, 1969/1972; see also Van Dijken, Van Der Veer, Van IJzendoorn, & Kuipers, 1998), Miller claimed that traumas do not result from frustrated fantasies, but from real, cruel events in an infant's life. Alluding to the Oedipus complex, she (Miller, 1981/1998, p. 52) claimed,

> I do not regard the parents of a patient only as objects of his or her aggressive and libidinous desires but also as real persons, who—often without knowing or intending it—have caused the patient real, not only imagined, suffering.

Importantly, Miller claimed that only some childhood traumas have a sexual origin—a child can be traumatized in many different ways.

Psychobiographies

To back up her insights, Miller, like Freud, wrote several psychobiographies. She studied the childhood of politicians and dictators

(e.g., Hitler), philosophers (e.g., Nietzsche), writers (e.g., Dostojevski, Kafka, Proust, Woolf), painters (e.g., Picasso), and comedians (e.g., Keaton), trying to reveal how their work and ideas are rooted in their childhood experiences. Miller was convinced that the work of artists tells the "encoded story of the childhood traumas no longer consciously remembered in adulthood" (Miller, 1988/1991a, p. 73). However, she (Miller, 1979/2007, pp. 3–4) complained that the early years of the artist' life received scant attention in the work of biographers:

> In reading the biographies of famous artists […] one gains the impression that their lives began at puberty. Before that, we are told, they had a 'happy,' 'contended,' or 'untroubled' childhood, or one that was 'full of deprivation' or 'very stimulating'. But what a particular childhood really was like does not seem to interest these biographers—as if the roots of a whole life were not hidden and entwined in its childhood.

To gain insight into the relationship between childhood experiences and adult life, Miller collected as much information as possible about the artist's childhood situation, and aimed to picture how the child would *feel* in that situation. For example, trying to understand the later work of Picasso, Miller discovered that the painter experienced a severe earthquake at the age of three when his mother was highly pregnant with his first sister. The family had to flee through the dark night and settled down at a refuge at which his mother gave birth three days later. Despite the significance of such events, especially for a young child, Miller (1988/1991a) found out that this event was not mentioned at all in the many books on Picasso's life that she had read.

Miller's most compelling psychobiographies are arguable those of dictators. Being a war victim herself, she tried to understand the roots of violence. In her view, these roots are not innate but reactive—violence and hatred are not the result of a death instinct, as Freud's psychoanalysis stated, but of cruelty in childhood. Hitler, for example, was not born as a dictator. Rather, he grew up in a totalitarian regime with a dominant, aggressive, and traumatized father who severely beat his children, and extorted obedience and gratitude. For the young Adolf there was no escaping from the situation—even his mother, subjugated to the same regime, could not protect her children. In fact, she ruled over the children when her husband was away from home.

In her book *For your own good*, Miller (1980/2002) argued that although some of Hitler's traumatic experiences showed themselves

almost uncoded in his work (e.g., in his book *Mein Kampf*), as an adult, Adolf Hitler was not capable of fully experiencing the physical and psychological suffering that was inflicted on him as a child. Several severe traumas were strongly buried in his unconscious, but severely affected his own life and ruined that of many others. When it comes to dictators and (serial) killers, Miller (1980/2002, p. x; emphasis in original) always discovered this pattern:

> [E]xtreme abuse, lack of helpful witnesses, glorification of violence, and the compulsion to repeat, with a photographic precision, what has been endured in the early years. […] I recently found confirmation of my hypothesis that serial killers have been severely mistreated as children, and that most of them deny their abuse. The few who don't, I believe, blame themselves for the abuse, calling it discipline or correction or a proper strictness. For *that* reason, for that confusion, they become killers.

Obviously, this pointing to Hitler's problematic childhood might explain his later behavior, but of course does not justify it.

Miller's psychobiography of the celebrated philosopher Friedrich Nietzsche is also of interest here. Even a superficial reading of the philosopher's many works reveals a hostility toward Christianity and women. This is all well acknowledged in the literature, and some philosophers have even placed Nietzsche's opinion about women into a psychological perspective. For example, in his *History of Western philosophy*, Russell (1946/1995, p. 734) claimed:

> It is obvious that in his day-dreams he is a warrior, not a professor; all the men he admires were military. His opinion of women, like every man's, is an objectification of his own emotion towards them, which is obviously one of fear. 'Forget not thy whip'—but nine women out of ten would get the whip away from him, and he knew it, so he kept away from women, and soothed his wounded vanity with unkind remarks.

In her book *The untouched key*, Miller (1988/1991a) gave a deeper and arguably more sophisticated interpretation of Nietzsche's opinions and feelings, studying his problematic childhood. When Nietzsche was four, his beloved father suffered from a brain disease, turned unpredictable, lost his intelligence, and passed away after some months. Shortly

thereafter, Friedrich's little brother died too. As a result, Nietzsche was the only man in the family. However, none of the women at the household treated him with love and respect. In fact Nietzsche was surrounded by restrictions and Christian moral virtues, and was taught discipline and self-control. As Miller (1988/1991a, pp. 81–82) put it:

> [H]e constantly heard the Christian virtues of neighborly love and compassion being preached all around him. Yet in his own daily experience no one took pity on him when he was beaten; no one saw that he was suffering. No one came to his aid, even though so many people around him were busy practicing the Christian virtues. What good are these virtues, the little boy must have kept asking himself. Am I not also the 'neighbor' who deserves to be loved?

It is not difficult to picture the loneliness and puzzlement that the little Nietzsche must have been experiencing. According to Miller, these traumatic experiences explain why Nietzsche suffered from a bad health and severe headaches, and why his voice became so loud and forceful when he became a professor. It also explains several of his 'philosophical' statements: His claims about Christianity and women, and his deep desire to liberate himself that manifests itself so clearly in Nietzsche's book *Thus spoke Zarathustra* (1883–1887/2003). How eloquent, poetic, sharp, and deep Nietzsche's texts are, many of his statements are, in Miller's view, not rooted in philosophical analyses, but in childhood traumas.

Abundant childhood injuries

What is interesting for our purposes is Miller's claim that childhood injuries are not confined to dictators and troubled philosophers, writers, and artists; rather, *we nearly all have them*. To understand this, further insights into Miller's ideas about the vulnerable childhood situation are needed. Key to her perspective are the many needs of children and the total reliance of children on their parents or caregivers for fulfilling them. In the first years of our lives, we were close to helpless. At the very start of her book *Banished knowledge*, Miller (1988/1991b, pp. 1–2) provided an apt description of this:

> Unlike animals, which generally become self-reliant shortly after birth, the human infant remains dependent on others for a

> very long time. He comes into the world as a bundle of needs, relying totally on the warmth of human arms, watchful eyes, and tender caresses. […] A baby requires the certainty that he will be protected in every situation, and that his arrival is desired, that his cries are heard, that the movement of his eyes are responded to and his fears calmed. The baby needs assurance that his hunger and thirst will be satisfied, his body lovingly cared for, and his distress never ignored.

The fact that children are completely dependent on their parents or guardians makes them extremely vulnerable. Indeed, if their parents or caregivers do not fulfill their needs, children are lost. They cannot choose their parents, and they cannot go somewhere else to receive love and protection. However, and as Miller endlessly insisted, for a healthy emotional development the child needs unconditional love—whatever feelings children have, they should be responded to with love, support, and care. According to Miller, only then, children can experience their own feelings and keep their integrity. However, this unconditional love and meeting the children's needs at all times hardly occur. Miller pointed out that one of the main reasons for this is that parents are themselves victims of their own childhood. As a result, they are not sensitive to the many needs of the children; rather, they long for a child with certain qualities and moods. For instance, they want to have a child who is happy, smart, and interested in certain things. But in those situations, the child is no longer an end, but a means to fulfill the needs of the parents. Although there is certainly a normative aspect to Miller's work here, for our purposes her hypotheses about the long-term consequences of certain childhood experiences are more important. They help us understand our affective engagement with the world and the invitations it consists of.

Miller asserted that the situation of parents or caregivers not fulfilling the child's many needs is harmful (see also Nelson, Fox, & Zeanah, 2014)—it will cause an unbearable pain that the child is not capable of coping with. Indeed, for children, the realization that their parents cannot give them what they need is too overwhelming. Following the Freudian tradition, Miller claimed that in these situations the child has no option but to repress her feelings—they are buried in the unconscious, but seriously affect the person's life. Indeed, from that moment onwards, the person tries to avoid situations that

resemble the painful childhood situation she has found herself in. As Miller (1979/2007, p. 2) once characterized our adult emotional life:

> [Most people] continue to live in their repressed childhood situation, ignoring the fact that it no longer exists. They are continuing to fear and avoid dangers that, although once real, have not been real for a long time. They are driven by unconscious memories and by repressed feelings and needs that determine nearly everything they do or fail to do.

For example, when a person has been oppressed in her early years, she tries to avoid that situation in her adult life. She might refuse to work for a boss, or tries to make sure, in whatever way, that she will be in charge when operating in a group. And when an adult was abandoned in early childhood, she is likely to have trouble starting relationships, or clings anxiously to the person she is romantically involved with. Separating from a loved one should never happen again.

The effects on adult emotional life

Since the introduction of her novel ideas in the 1980s, several clinical psychologists have found inspiration in Miller's theory and developed it further. Of particular interest in this respect is Jenson (1995/1996). She followed Miller in her overall framework but developed an arguably more sophisticated view of how childhood injuries affect adult emotional life (see also Bosch, 2003/2017). At this point it is important to stress that her approach, like Miller's, is not in keeping with some important Gibsonian tenets. Especially the idea that we have an inner container packed with repressed memories that affect our perception is unacceptable for Gibsonian psychologists. I will turn to preparing Miller's and Jenson's ideas for a neat integration into the ecological approach in the final section of this chapter, but for now I will basically follow their line of thinking, adopting the terms that they had introduced.

Central in Jenson's view are the concepts of *symbols* and *defense responses*. In line with Miller, Jenson asserted that children cannot cope with the situation that their parents or caregivers do not fulfill their fundamental emotional needs. Hence, in those situations, children have no option but to block their painful experiences, burying them as

memories in their unconscious minds. However, this repression comes with a price. Indeed, Jenson claimed that because of this repression, several situations and persons become symbolic—they show similarities with the repressed experience and, thus, 'trigger' them. And because it is necessary for the child that the repressed memory does not enter consciousness, the child develops several defense responses that ensure that the memory remains buried. These responses are generally concerned with struggling with or avoiding the symbolic situation. After all, that situation now *feels* dangerous.

Crucially, Jenson (1995/1996, p. 83; emphasis added) claimed that many of our emotions (and struggles in life) result from these defense responses that we had to develop as children but that are still active in our adult lives:

> [M]ost people unknowingly live their adult lives as if they were still in childhood. Whatever we are still unconsciously 'working on' getting, or protecting ourselves from—that is, and old, unmet need from childhood—will actively affect our thoughts, feelings, and behavior in *the most important areas of our lives*.

In her book, Jenson discussed several concrete situations in which the defense responses manifest themselves in our adult lives. They can be easily recognized as over- or underreactions (Jenson, 1995/1996)—responses that are not proportional to the actual situation. And there are different ways in which this can occur (see also Bosch, 2003/2017).

Fear

The response of fear is one of the overreactions that Jenson discussed in her many portrayals of our daily struggles. It is widely acknowledged among biologists and psychologists that fear can be an adaptive behavioral response. If an animal finds itself in a life-threatening situation, fleeing is one of the ways in which the animal can escape from the threat or alleviate it (e.g., Darwin, 1872/1998). Think about a car approaching you with high speed, or an aggressive animal that is about to attack you. However, in adult life, fear manifests itself in many situations that are not dangerous at all. Moreover, different people fear different things. The list of objects or situations that people can fear is almost unlimited: missing a flight, going alone on holiday, being criticized by colleagues, not becoming a senior lecturer, not being

accepted by the family-in-law, the dentist, and so on. Although some of these situations might not be pleasurable, they are not life-threatening for an adult.

Jenson (1995/1996, pp. 41–42) made a strong distinction between the needs of children and the needs of adults. For children, not being accepted or being criticized by the caregivers is dangerous. After all, and as previously mentioned, children are completely dependent on them for the fulfillment of their many (emotional) needs—when these needs are not met, their lives are at stake. For adults, on the other hand, being criticized or not being accepted is not something that has to be avoided. Adults have only a few basic needs (food, shelter, safety, and some money) and they are no longer dependent on others for the fulfillment of those needs. Of course, the vast majority of adults long for loving relationships (and other meaningful things in life), but unlike children, they can live without it.

Hence, Jenson (1995/1996) asserted that when an adult becomes frightened in a situation that is not dangerous, a defense response is activated by a symbol. Something in the situation (unconsciously) reminded the person of a childhood injury that triggered the defense response of fear—the person now experiences a strong urge to escape from the situation, from the *apparent* threat. She might 'decide' not to give the oral presentation, try to avoid the colleague whose critique she fears, does not ask her boss for promotion (despite all the wonderful work she did) because she fears her angry response, and so on.

False hope

Another defense response that Jenson (1995/1996) discussed is that of "false hope" (p. 49). That response is not focused on avoiding something (like fear) but on getting something, resulting in an active or even hyperactive state. For example, an employee might work very hard such that she will make a promotion; a husband may be very sweet to his wife to get her full attention; and a professor does his ultimate best to deliver a series of wonderful lectures to get the approval of the students. When the defense response of false hope is activated, there is a strong feeling that one *needs* this promotion, attention, or approval (Bosch, 2003/2017).

Miller (1979/2007) argued that children tend to develop this false hope if the love of their parents is conditional rather than unconditional. As we have seen in the earlier portrayal of her insights, for

a healthy emotional development, children need to be loved and respected no matter who they are and what feelings they have. In many, if not all, families, this does not happen, at least not at every moment in time. As a result, the children have to repress the pain that they are not loved for who they really are. In addition, and importantly, children are going to live up to the expectations of their parents. If I will do my best at school, be sweeter to my brother, help more frequently in the household, then they will love me. Indeed, children are gifted in feeling what their parents want and need—they cannot run the risk of rejection (Miller, 1979/2007).

It is not difficult to recognize this defense mechanism in society—many adults still strive for something *and* feel that they need the approval, admiration, or other positive response that they expect to be the result of their activities. If I lose weight, then people will love me; if I give a sublime talk, then I will be fully respected by my colleagues; if I do not make any mistakes, then he will accept me. And on and on and on. However, according to Miller (1979/2007) and Jenson (1995/1996), this defense response of false hope is basically the result of childhood injuries.

Anger

Like fear, anger can be very adaptive. When an animal is seriously threatened, the animal can either flee or fight to change the dangerous situation. Hence, aggression can be functional and is often essential for survival (e.g., Darwin, 1872/1998). However, just like fear, anger is often triggered by situations that are not dangerous. Some people get angry when they are criticized; some when they do not get the recognition they believe they deserve; some when their partner is not doing enough in the household, and so on. Jenson (1995/1996) described many situations in which people are in business of "arguing, badgering, criticizing, complaining, whining, blaming, yelling, seething, withdrawing, refusing to talk, denying that there's anything wrong, and retaliating, to name but a few" (p. 89). Except when there is a life-threatening situation, these behaviors are in her view all instances of the defense response of anger to a certain symbolic situation—they are all overreactions.

Note that the above three defense responses are all aimed at avoiding a symbolic situation. In the case of fear, people tend not to enter the situation or escape from it; in the case of false hope, people

do their (very) best to prevent the situation to happen; and in the case of anger people use aggression in the hope to change the situation. And because of their different childhood situations, different people try to prevent different situations and do so in varying ways.

Preparing the ideas for integration

It is not difficult to see connections between the above perspective and the approach that I have laid out in Chapter 3. Indeed, one can conceive the symbolic situation as the environment's invitation which draws the person in, giving rise to emotional responses like fear or anger. Moreover, Miller's perspective shows that many of the invitations in the adults' lived environment are contingent on childhood experiences. Yet, much work needs to be done to integrate the gist of Miller's insights into the ecological framework. Although Miller broke with aspects of Freud's theory (e.g., the Oedipus complex), she retained working within his overall framework—she (and Jenson) believed that our adult emotional life is largely governed by repressed feelings and beliefs that are buried in our unconscious. And as phenomenologists have shown over the last decades, Freud's way of thinking is essentially Cartesian (e.g., Dreyfus & Wakefield, 1988/2014; Fuchs, 2007; Stolorow, 2007). It, too, holds that ideas are stored, that we have representations and memories that are buried in our (unconscious) minds. These Cartesian assumptions also clearly manifest themselves in Miller's view of the therapeutic process, a view that Jenson endorsed— "[w]e can repair ourselves and gain our lost integrity by choosing to look more closely at the knowledge that is *stored inside our bodies* and bringing this knowledge closer to our awareness" (Miller, 1979/2007, p. 2; emphasis added; see also Jenson, 1995/1996, p. 5). Dreyfus and Wakefield (1988/2014, p. 170) called this way of thinking a "depth psychology":

> In depth psychology the basic problem is that some mental contents are unconscious, and not properly integrated into the ego's overall set of representations. Therapy thus consists of helping the patient to uncover the hidden contents and to reintegrate them into his overall mental system. Since the patient has strong motivations for keeping these contents hidden, the therapist must contend with the patient's resistance to allowing the contents to emerge.

Obviously, this representationalist view is not in keeping with the Gibsonian framework. Indeed, Gibson explicitly argued against the idea that information is stored inside the body. Hence, to integrate Miller's ideas with the ecological view advanced in this book, we have to strip Miller's view from the representational way of thinking. We have to get rid of the contentions that (repressed) feelings are *stored* inside the body (including the brain) and that they can be *retrieved*; that the mind is making up the world; that perception is a process that takes place in the brain, and so on.

However, the good news is that even if we do not accept these representationalist ideas, we can still retain Miller's main insight that we all have childhood experiences (and injuries) that affect our emotional lives. This is an idea that an affective ecological account can and, in my view, must adopt. Moreover, although Jenson's (1995/1996) portrayal of the emotional responses that are the result of childhood injuries needs to be (scientifically) scrutinized and perhaps adjusted, it can serve as an entry point that an ecological account can build upon. Indeed, her perspective leads to hypotheses about the long-term behavioral consequences of certain childhood experiences which can be tested in observational studies (see also Chapter 6). However, because the ecological account is not compatible with the idea of repressed memories that are stored at the bottom of our mind, the ecological view will not accept their supposed role—the function of 'defense responses' like fear, false hope, and anger is *not* to repress traumatic experiences.

Interestingly, some phenomenological accounts have been developed that provide an alternative interpretation of childhood injuries, and one that can pave the way for an ecological approach. Indeed, after criticizing Freud's psychoanalysis, Dreyfus and Wakefield (1988/2014) were quick to sketch a phenomenological alternative. Drawing on the insights of Heidegger and Merleau-Ponty, they developed a "breadth psychology". This approach holds that traumas affect the person's being-in-the-world (see also Fuchs, 2007). Dreyfus and Wakefield (1988/2014) fully recognized the fact that traumatic experiences in the early years of life can have a lifelong effect on the person's being. In fact, their view is in keeping with Miller's (1979/2007) idea that many adults still live in their "childhood situation" (p. 2). However, rather than drawing on Freud's framework, they build on Merleau-Ponty's (1945/2014, p. 85; emphases added) phenomenological insights to account for this:

> Impersonal time continues to flow, but *personal time is arrested*. Of course, this fixation is not to be confused with a memory, it even excludes memory insofar as memory lays a previous experience out before us like a painting. On the contrary, *this past that remains our true present does not move away from us*; rather, in lieu of being displayed before our gaze; it always hides behind it. *Traumatic experience does not subsist as a representation in the mode of objective consciousness* and as a moment that has a date. Rather, its nature is to survive only as *a style of being* and only to a certain degree of generality.

Dreyfus and Wakefield (1988/2014) elaborated on the above insights by drawing on Heidegger's (1927/1962) concept of *Befindlichkeit*, mainly to further Merleau-Ponty's idea of "generality". In their view, a painful emotional episode in the life of a child can seriously affect the child's *Befindlichkeit*, implying that the world shows up differently to the child from that moment onwards. Indeed, this episode can totalize the child's lived world. "[A] child's anger at how his farther is treating him becomes anger at how his father *always* treat him, and even rage at how *everyone* has always treated him" (Dreyfus & Wakefield, 1988/2014, p. 173; emphases in original).

Hence, although both Miller and the phenomenologists (e.g., Dreyfus & Wakefield, 1988/2014; Fuchs, 2007) emphasized the severe effects of childhood injuries, they differed in their view of how these injuries had this effect on adult life. Instead of adopting a "'cellar' theory of the unconscious" where repressed feelings are buried "*below the ground*" (Fuchs, 2007, p. 429; emphasis in original), phenomenologists focused on the (disturbed) lived environment of the client. As Fuchs (2007, p. 430; emphasis added), another proponent of this view, put it:

> The past's traces, however, are not hidden in *some inner world of the psyche*. They manifest themselves in the 'blind spots', gaps, or curvatures of lived space, in the patterns of behavior that entrap a person time and again, in the actions the individual refuses to take, in the life he does not dare to live, etc.

Note that although this phenomenological approach provides an alternative perspective on the impact of childhood injuries, it is in keeping with the defense responses to childhood injuries that Miller

and Jenson described. Indeed, the "'blind spots', gaps, or curvatures of lived space" (Fuchs, 2007, p. 430) indicate, among other things, the often harmless situations that a person aims to avoid in one way or another (e.g., by means of fear, false hope, anger). For example, after a painful or even traumatic experience in her childhood, a certain event becomes a "repulsive space" (Fuchs, 2007, p. 431) in her lived environment. Although this event is no longer dangerous for the adult in question, she aims to avoid it at all costs.

In the remainder of this book, some of the above phenomenological insights will be used and further discussed. However, because the purpose of this book is to develop an affective Gibsonian psychology, I will turn in the chapters that follow to the central ecological concepts of direct perception, information, affordances, and invitations. The challenge will be to develop a framework that integrates the core ideas of Miller with the overall ecological theory.

5

EMOTIONS AND THE (MIS)PERCEPTION OF AFFORDANCES

In Chapter 3, we have seen that many emotional responses are adaptive. For example, a person encounters a situation that is dangerous for her (e.g., an aggressive barking guard dog), and this solicits an emotional response (e.g., fleeing) that alleviates the threat. Indeed, as has been widely acknowledged in the literature for centuries, emotions have a clear survival value (e.g., Darwin, 1872/1998). However, in Chapter 4, I have focused on the strong individual differences in our emotional reactions to certain situations. Following Miller, I have argued that many adults try to avoid situations that resemble the painful situations that they have found themselves in when they were a child. As I have touched upon earlier, this raises interesting questions for the ecological perspective. Do humans perceive affordances in those cases? Or do they misperceive them? And if so, how to conceptualize these misperceptions? What does it mean for the conception of the lived environment? Does it consist of soliciting affordances?

In this chapter, I will try to answer these questions. To that end, I will first turn to a discussion of the ontological status of affordances—there have been tough debates about what affordances are and what they are relative to. I will argue that although the developmental history determines the affordances in someone's environment, this history also gives rise to a frequent misperception of them. The outlines of an ecological conceptualization of misperceiving will be sketched that can capture this. Earlier, De Haan et al. (2013, 2015)

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have worked on an ecological conception of the lived environment to describe, among other things, the experiences of patients before and after a deep brain stimulation (see also Rietveld & Kiverstein, 2014). However, I will argue that their concept of the field of affordances cannot easily accommodate the misperception of affordances. It is ultimately argued that our lived environment consists of invitations rather than of (soliciting) affordances.

Some debates about the ontology of affordances

Ever since Gibson introduced the concept of affordance, its ontological status is highly discussed. Unfortunately, there have been separate debates within different groups of authors. For example, in the 1980s interesting discussions of affordances appeared in the *Journal for the Theory of Social Behaviour* (e.g., Heft, 1989; Noble, 1981; Shotter, 1983). These discussions centered around the lessons of pragmatism and phenomenology for theorizing about affordances. Among the issues that were addressed is whether affordances come into existence when agents and objects meet, or whether they already exist before the encounter. Shotter (1983, p. 27; emphasis in original), for example, opted for the former:

> [A]n affordance is only completely specified *as the affordance it is* when the activity it affords is complete. Thus although it may seem that affordances are 'there' in the environment irrespective of whether anyone is there in the environment to perceive them or not, this is not so.

Costall (1995, 1997) responded to Shotter when he "socialized affordances". In his view, the meaning of objects is not determined by the individual act, but by the social practices they take part in (see also Heft, 1989; Hodges & Baron, 1992). Although each and every object affords a myriad of activities, there is generally such a thing as the "canonical affordance" of the object (Costall, 1997). For example, chairs are for sitting on, and this meaning is independent of whether a certain person uses it in that way at a particular moment in time. As Costall (1997, p. 79) put it:

> A hammer is a hammer whether or not I choose to use it as such. Each object has its own definite, relatively enduring, meaning

> which, though not independent of 'us', transcends whatever individual transactions I might have with it. Its meaning is 'impersonal' (Morss, 1985).

Another group of ecologically motivated thinkers, however, barely responded to these discussions and the issues raised. They did not take the social dimensions into account when discussing the ontology of affordances. In fact, they defined affordances independently of the actions of the (potential) users (for my own stance on this issue see Chapter 6 and the Epilogue). Yet, within this group there was substantial disagreement on the ontological status of affordances. Inspired by physics, Turvey (1992), for example, tried to link affordances with lawfulness—"real possibility" (p. 177). In his view, affordances are best thought of as dispositions of the environment. And because dispositions always come in pairs, these dispositions are complemented with dispositions of the animal (what Turvey and Shaw [1978] called "effectivities"), that can actualize the affordance. In his evolutionary account, Reed (1996a), on the other hand, conceived affordances as resources that exert selection pressures on the evolving population—they drive the evolutionary trajectory and are responsible for the origin of action systems. And recently, Chemero (2003, 2009) argued that affordances are neither dispositions nor resources; they are not even in the environment. Rather, in his view, affordances are relations between features of the environment and abilities of animals, and he made a comparison with the taller-than relation to explain his account. Imagine that Joep is taller than Teun. Crucially, taller-than is not a property of either Joep or Teun, but refers to their relation. Chemero (2003, 2009) asserted that the same holds true for affordances—they are not in the environment, nor in the organism, but refer to their relation.

Fortunately, in more recent years, a growing number of authors have placed the social central again in their understanding of affordances (and life in general). In a direct response to Chemero (2003, 2009), Rietveld and Kiverstein (2014, pp. 330–331), for example, claimed:

> [T]ying affordances to the 'abilities of organisms' fails to do justice to the different grains of analysis on which organisms' activities can be described. We believe it is more precise to understand abilities in the context of a form of life. In the human case, this form of life is sociocultural, hence the abilities

> that are acquired by participating in skilled practices are abilities to act adequately according to the norms of the practice. Moreover, once we see that the spectrum of abilities available in a form of life include skilled activities and expertise, it becomes apparent that the landscape of affordances is much richer in terms of the affordances it offers than might have been apparent on Chemero's (2003, 2009) account.

Drawing on Wittgenstein's (1953) concept of "form of life" and the ecological perspective of the anthropologist Ingold (2000), Rietveld and Kiverstein (2014) showed the richness of our engagement with the world. And if affordances are relative to the whole spectrum of our skills and expertise, then the concept of affordances can also capture more 'cognitive' phenomena. For instance, it can allow for an analysis of the design process of architects (e.g., Rietveld & Brouwers, 2017; Van Dijk & Rietveld, 2021), or the cultural differences in the engagement with the environment (see Ingold, 2000).

Developmental history and (the perception of) affordances

Although not explicitly suggested by Rietveld and Kiverstein (2014), one might argue that someone's skills are, at least partly, determined by the developmental history of a person, including the childhood experiences and injuries. After all, and as we have seen, these experiences determine the person's emotional engagement with the world, the life she is living. For example, for a person who has been abandoned by her parents as a child, there are different affordances than for a person who did not have to experience this. Having a stable, loving relationship with another person might be a possibility for the latter person but not for the former. Hence, one might argue that when the person who was abandoned as a child is afraid of starting a relationship, she is adaptively perceiving the (absence of an) affordance. Similarly, for an adult who has been severely criticized as a child, the fear of public speaking is fitting. That is, these persons are accurately perceiving the affordances that are the result of their developmental history.

Although it is almost a truism that the developmental histories of persons determine their capabilities and, thus, the affordances in their environments, I believe that the above construal of *the perception*

of affordances is misguided. To go back to the example of the person who was abandoned by her parents as a child, due to these traumatic experiences this person may now lack the capacity of having a balanced relationship with someone (although this might change after therapy). Yet, the intense fear that this person is experiencing indicates that she is still living in her "childhood situation" (Miller, 1979/2007, p. 2)—the person tries to avoid a situation that was once dangerous but has not been dangerous for a very long time, to paraphrase Miller (1979/2007, p. 2). Indeed, if one follows Jenson's theory of the needs of adults, as I do, then we have to conclude that there is no threat in this concrete situation. Starting a relationship and splitting up after a while because it does not work out is not dangerous for an adult. And this holds true also for the person who was abandoned as a child. Hence, in some fundamental way, this person is not in perceptual touch with what the very situation affords her. She is, to adopt Gibson's (1979/1986, p. 142) terminology, *misperceiving the affordance*. Importantly, qualifying her perception of danger as a misperception is not downplaying her emotion. The experienced fear is as real as it can be—this is how she finds herself in the world.

I believe that, generally speaking, misperception and the earlier discussed defense responses go hand in hand (Miller, 1979/2007; Jenson, 1995/1996). That is, misperceptions also occur if persons fear, for example, a disapproving glance, an angry boss, or a divorce. For adults, none of these situations are dangerous, despite the strong feelings a person might have. Hence, these persons too are *misperceiving* what the concrete situations *afford*. And similar misperceptions occur when the defense responses of false hope and anger are activated. As we have seen, in case of the former, persons aim to achieve something by doing their very best. However, the underlying tension is that not achieving the goal is something that must be avoided—not becoming a full professor, not being loved by the family-in-law, not having her approval *feels* dangerous. But given the few needs of adults and their overall independency, such situations no longer form a threat (Jenson, 1995/1996).

Misperceiving affordances

If the above analysis is correct, and we indeed frequently misperceive affordances, then an affective ecological psychology is in need of a theory of misperception that can deal with our varying emotional

engagement with the world. Misperception has always been a thorny issue in ecological psychology. Although Gibson had developed an account of it, the very existence of illusions has often been taken as a rejection of Gibson's direct perception theory. Gregory (1997), for example, wrote, "[t]o maintain that perception is direct, without need of inference or knowledge, Gibson generally denied the phenomena of illusion" (p. 1122). However, Gibson did that by no means. Granted, he stressed in his first book that the "real mystery and the really important problem" (Gibson, 1950b, p. 43) about perception is that it is generally accurate. But, and as alluded to in the previous section, Gibson fully recognized the existence of misperception. For example, in his final book, he stated, "[e]rrors in the perception of the surface of support are serious for a terrestrial animal. If quicksand is mistaken for sand, the perceiver is in deep trouble" (Gibson, 1979/1986, p. 142). When discussing the famous visual cliff experiments, Gibson argued (1979/1986) that "if a sturdy sheet of plate glass is extended out over the edge it no longer affords falling and in fact is not dangerous, but it may still *look* dangerous" (p. 142; emphasis in original). And when it comes to social behavior, Gibson asserted that all of our social behavior "depend on the perceiving of what another person or other persons afford, or sometimes on *the misperceiving of it*" (p. 135; emphasis added).

Importantly, Gibson did not only recognize misperception but also developed an account of it. For example, he explained the well-known Müller-Lyer illusion in terms of the information that perceivers detect. In Gibson's (1966, p. 313; emphasis in original) words:

> But the *information* for length of line, I have argued, is not simply length of line. To suppose so is to confuse the picture considered as a surface with the optical information to the eye. A line drawn on paper is not a stimulus. The stimulus information for the length of line is altered by combining it with other lines. We should never have expected equal lengths to appear equal when they are incorporated in different figures. Only if we can isolate the two line segments from the wings and arrowheads in the Müller-Lyer illusion should they appear equal, and this would require a very special kind of selective attention.

This quote is regularly used by Neo-Gibsonians. However, interestingly they tend to leave out the final two sentences of this quote (see e.g., Michaels & Carello, 1981, p. 92). One of the reasons for doing so

might be that they defended a different position than Gibson when it comes to misperception. Indeed, Cutting (1982) stressed that Gibson's perspective differs in some fundamental ways from that of Turvey and Shaw, also with respect to perceptual error. Gibson fully recognized misperception, but in their ecological "reformulation", Turvey, Shaw, and their students claim that "error is nonexistent" (Cutting, 1982, p. 210). For instance, when discussing the Müller-Lyer illusion, Michaels and Carello (1981) argued that not the perceiver but "the *scientist is in error*—that is, he or she is measuring the wrong thing" (p. 92; emphasis in original). Building on the first part of the above quote from Gibson, they stated that "the disparity between some measure of the 'stimulus' and a perceiver's report is due to a confusion on the part of the measurer, between things and information" (p. 93).

An ecological account of misperception

Although some ecological psychologists have explained perceptual error away, several ecological accounts of misperception have been developed over the last decades, all of which are in line with the main tenets of the Gibsonian framework (e.g., De Wit, Van Der Kamp, & Withagen, 2015; Heft, 2001; Reed, 1996b). As we have seen in Chapter 2, Gibson disputed the Cartesian idea that perception is a mental state residing in the head that may or may not correspond to the environmental state of affairs. Accordingly, an ecological account of misperception cannot be framed in terms of a lack of correspondence between an internal state and the environment (Heft, 2001, p. 80), as many cognitive theories tend to do. Instead, it should be developed within Gibson's (1979/1986) overall idea that perception is a "keeping-in-touch with the world" (p. 239). Earlier I have argued that this idea allows for a conception of misperception as a loosened grip on the environment's affordances (Withagen, 2004; Withagen & Chemero, 2009). Although Gibson was inclined to think of the animal's perceptual grip on the environment as all or nothing (see e.g., Gibson, 1959, p. 464), I suggested that it might be better conceived as a continuum—that is, the perceptual grip can vary in degree.

This conceptualization of misperception starts from the assumption that the patterns in the ambient array differ in their degree of usefulness in constraining the perception (see also Jacobs & Michaels, 2007). Some patterns specify the to-be-perceived affordance, and thus guarantee a perfect perceptual grip on it. Other patterns correlate

highly with the affordance and thus allow for a firm grip on it. And still others correlate less highly with the action possibility, implying that the detection of those patterns can establish only a weakened perceptual grip on the affordance. For example, when a goalkeeper attempts to stop a penalty kick there are several patterns in the penalty-taker's movement that the keeper can rely upon. And these variables differ in the degree of usefulness—they vary in their correlation with where the ball will be kicked. Hence, the strength of the keeper's perceptual grip on the ball direction is determined by what informational variable is detected (e.g., Dicks, Van Der Kamp, Withagen, & Koedijker, 2015).

Although I believe that this continuum-of-contact idea is still useful for understanding the individual differences in perceptual skills, it does not equip us to understand the different emotional responses to social events that I have discussed in Chapter 4. Consider, for example, the different emotional reactions that two assistant professors (with similar intellectual capacities but different developmental histories) might have when they are invited to give a lecture at a prestigious institute. One professor might fear the presentation and is thinking of excuses for not giving it. The other professor might look forward to delivering her address. The difference between these two persons is not that they vary in the degree of their perceptual grip on a particular affordance (as in the example of the goalkeepers); rather they have a *qualitatively different perception* of the same situation. One person perceives the event to be dangerous (e.g., a critical audience that will vilify her work), whereas the other person apprehends a nice upcoming event full of opportunities. The continuum-of-contact idea is not suited to describe these qualitatively different experiences of the same situation.

I believe that phenomenology can be of great help here. It can offer us an alternative ecological conception of misperception that can capture our emotional functioning *and* is grounded in the idea that perception is a "keeping-in-touch with the world" (Gibson, 1979/1986, p. 239). Specifically, I think that the idea of a disturbed being-in-the-world is useful for understanding our maladaptive emotional responses (e.g., Dreyfus & Wakefield, 1988/2014; Fuchs, 2007). To go back to the above example, the assistant professor who fears giving a presentation at a prestigious institute does not have a *weakened grip* on the environment, but a *disturbed* one. The person is directly coupled to the environment, paying full attention to some of its features, but her

response is not proportional to the actual situation. Indeed, and as we have seen in the final section of Chapter 4, several phenomenological accounts have stressed that childhood injuries manifest themselves in a different relating to the world. As Fuchs (2007) stated it, "psychopathology may be regarded as a *narrowing or deformation of an individual's lived space*, as a constriction of his horizon of possibilities, including those of perception, action, imagination, emotional and interpersonal experience" (p. 428; emphasis in original).

Ingold's (2011) concept of *being-alive-to-the-world* might even further explicate the above portrayal. Ingold (2011, p. xii, emphases in original) introduced this concept to emphasize aspects of the human condition that, in his view, many philosophers have insufficiently recognized:

> Philosophers have mediated at length on the condition of being in the world. Moving, knowing and describing, however, call for more than being *in,* or immersion. They call for observation. A being that moves, knows and describes must be observant. Being observant means being alive *to* the world.

One might argue that an emotionally stable person is alive to the world—this person responds to the world with "care, judgment and sensitivity" (Ingold, 2011, p. 75). However, for a person who suffers from a mental illness the responses are maladaptive; certain objects and places in the lived environment prompt inappropriate, exaggerated emotional responses. The person is not alive to the world, but struggles with it. And again, this holds true not only for a person who suffers from a serious mental illness (e.g., depression, panic disorder), but also for a 'normal' person who fears, for example, a certain meeting, or becomes angry with her boss because her work is not valued enough, or checks an email over and over again to make sure it is flawless before sending it, and so on. In those cases too, there is a senseless struggle with harmless aspects of a world, indicating a disturbed relation to them.

This conceptualization of misperception as a disturbed relation with the environment keeps us far from the representationalist theory of perception. It does not suggest a lack of correspondence between a mental representation and the environmental state of affairs—no mental constructs that mediate between the world and behavior are introduced. Instead, the conceptualization implies that the person is

directly coupled to the environment, but that her relation to it is maladaptive and disturbed. That is, the person's reaction is not in line with the more 'objective meaning' of the concrete situation. *But that is all there is to misperceiving the environment*—no internal world has to be introduced, no lack of correspondence has to be assumed. Note that this conceptualization can also accommodate the misperceptions that Gibson mentioned in his final book (1979/1986, p. 142). An adult who crashes into a closed glass door is not behaving in line with the more 'objective meaning' of the situation—what the situation actually affords her. And the same holds true for a person who is terrified of a *visual* cliff, or mistakes quicksand for sand.

In Chapter 6, I will argue that developmental systems theory offers a framework for understanding how childhood injuries and experiences can result in a disturbed relation to the world, without relying on Cartesian assumptions. But for now, a few words need to be said about how to conceive the lived environment and what role affordances have in it.

The lived environment

Several phenomenological accounts of the lived space have adopted the notion of affordances, also in the context of psychopathology (e.g., De Haan et al., 2013, 2015; Fuchs, 2007; Krueger & Colombetti, 2018). Arguably the most worked-out model has been developed by De Haan et al. (2013, 2015). As we have seen in Chapter 3, they made a distinction between the landscape of affordances and the field of affordances (see also Rietveld & Kiverstein, 2014). To reiterate, the former refers to the manifold of *possibilities for action* that are available in a certain form of life; the latter refers to the soliciting affordances for an individual animal in a specific setting and, thus, captures the animal's lived environment. The field of affordances "is thus an idiosyncratic subset of the general landscape of affordances" (De Haan, 2020, p. 218).

De Haan et al. (2013, 2015) used their notion of the field of affordances not only to capture experiences of 'normal' people, but also to illuminate the lived environment of people suffering from a depression or from an obsessive-compulsive disorder. For the depressed person, none of the affordances stand out, hardly any solicits a behavior (see Figure 5.1). Hence, the person is not alive to the world, she is not moved by it. For the person who suffers from an obsessive-compulsive

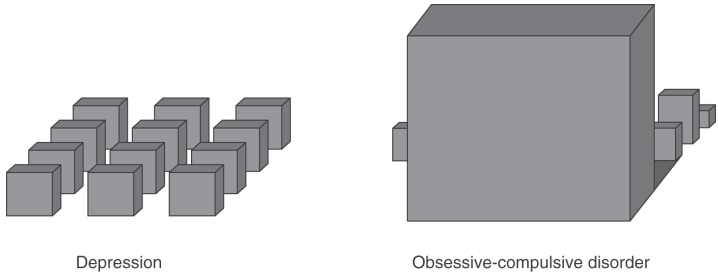

FIGURE 5.1 A field of affordances of a person suffering from a depression (left) and of a person with an obsessive-compulsive disorder (right). (From figure 1, De Haan et al., 2015, Creative Commons Attribution License applies.)

disorder, on the other hand, there are a few affordances that do stand out. But these affordances are prompting the same reaction over and over again, making the person not sensitive to all the other possibilities for action that are available in her environment. Hence, in many ways this person is not alive to the world either.

Although at first blush the concept of the field of affordances seems capable of capturing our emotional engagement with our environment (including those of psychiatric patients), it is not clear how some of the earlier examples of our emotional responses fit in. Indeed, the concept of the field of affordances seems ill-suited to accommodate the *misperception of affordances*. After all, it presupposes that behavior is always solicited by some (or more) of the affordances of the situation. But, as I have argued above, this is disputable. Imagine, for example, a person with a spider phobia living in the Netherlands, a country that is safe, at least when it comes to spiders. Yet, each and every encounter with a spider prompts an intense fear reaction in this person. So for her, spiders definitely press toward a definite action (fleeing), but it is not (the perception of) a particular affordance of the spider that is doing the work here. Indeed, the invitation is the result of the *misperception* of the affordance—the perception of a harmless creature as one that is dangerous, that she *must* run away from. And as we have seen throughout this chapter, many invitations are the result of the misperception of affordances. Every time one of our defense responses is activated, we are not in touch with what the concrete situation affords—we try to avoid a situation that is no longer dangerous.

Hence, in those cases, the environmental situation solicits an emotional response, but it is not (the perception of) the affordance of that situation that is in the driver's seat.

If the above analysis is correct, then ecological psychology is in need of a new conception of the lived environment. As previously mentioned, several early Neo-Gibsonians have followed Gibson in the idea that the animal's environment consists of possibilities for action (e.g., Turvey, 1992). Reed (1996a, p. 18; emphasis in original), for example, claimed that:

> The fundamental hypothesis of ecological psychology […] is that *affordances and only the relative availability (or nonavailability) of affordances create selection pressures on the behavior of individual organisms; hence, behavior is regulated with respect to the affordances of the environment for a given animal*.

However, and as I have argued in Chapter 3, several recent ecologically inclined authors have stressed that the animal's environment is not simply a manifold of *possibilities* (the agent intentionally chooses from), but generally *solicits* behavior (with animals unreflectively responding to the environment's calls). Yet, the above analysis indicates that the concept of the field of (soliciting) affordances (e.g., De Haan, 2020; Rietveld & Kiverstein, 2014) also falls short—the field of invitations is not necessarily "an idiosyncratic subset of the general landscape of affordances" (De Haan, 2020, p. 218). Granted, in many cases the environment's affordances solicit our behavior: It is the affordance of the delicate chocolate cake that invites eating, and the challenging affordances in a certain playground prompt children's play. But as we have seen, invitations are not always contingent on affordances. This means that the lived environment, the one we experience and regulate our encounters with, might be better thought of as a field of invitations than as a field of (soliciting) affordances.

Do we need the concept of affordances?

The above argument might raise the question of whether I believe the concept of affordances can be dispensed with. Does the concept of invitations suffice when discussing the environment? Or do affordances still deserve a place in an affective ecological approach? I would like to stress from the outset that I do think that the concept

of affordances is of value, but more in the evaluation of behavior than in the explanation of it. After all, to understand (or predict) someone's behavior it is more important what the environment solicits (e.g., the perception of a spider generally prompts a fear reaction in her) than what it affords (e.g., spiders in the Netherlands do not afford harm to her). Yet, I believe that the concept of affordances can help in determining whether a certain action is adaptive or appropriate. As has been well acknowledged in the literature on psychopathology, this is of course a tricky business (e.g., De Haan, 2020). For example, who decides when a fear reaction is inappropriate? Yet I believe that Gibson's concept of affordances can provide *some* help in settling such thorny issues (although it is unlikely to do all the work). Here are some first ideas.

As we have seen in previous chapters, Gibson had a severe tendency to objectify the environment. Reacting against the Gestalt psychologists' concept of demand character, Gibson opted for a pure *functional* description of the environment—it consists of possibilities for action. And although this conception of the environment is not that useful for understanding our daily behavior, it does allow us to capture the more 'objective meaning' of a concrete situation. Indeed, in the previous section, I have used an affordance analysis to claim that the person with a spider phobia was misperceiving the affordance. Of course, and as we have seen throughout the book, the 'objective meaning' is relationally specified—it is the physical makeup of the spider and of the woman that jointly determine that the former does not afford harm to the latter. But crucially, this conclusion that the spiders in the Netherlands are harmless for humans justifies the claim that the fear response of the woman is maladaptive, that she *mis*perceives what the spider affords.

My drawing on Jenson's (1995/1996) view of the needs of adults in determining whether emotional responses are adaptive or appropriate is also in keeping with such an affordance analysis. To reiterate, Jenson made a sharp distinction between the needs of children and the needs of adults. Adults have only a few basic needs (food, shelter, some money, safety) that they generally can take care of themselves. Children, on the other hand, depend on their caregivers for the fulfillment of their needs. Moreover, they need not only food, a bed to sleep in, and clothes that keep them warm, but also love and respect. Indeed, if only their physical needs are met, children's social, emotional, and cognitive development is severely affected, often with lifelong effects

(e.g., Nelson, Fox, & Zeanah, 2014). Hence, this analysis allows us to conclude that a certain situation *affords* harm to a child but not to an adult. For example, being abandoned *is* dangerous for a child but not for an adult. Thus, the intense fear that a child experiences when her parents leave her is fitting. But such fear can be qualified as an overreaction when your partner tells you she is going is to leave you. Granted, grieving makes perfect sense then (at least in many cases), but an intense fear is not proportional to the actual situation.

One might argue that the above analyses focus too much on the 'biological' needs of people, and do not reckon with the fact that ideas on the appropriateness of behavior depend heavily on the time and culture we live in (e.g., Foucault, 1961/2009). Shocking as it may sound today, homosexuality has been labelled as a psychiatric disorder till the 1970s (e.g., De Haan, 2020; Drescher, 2015). It is true that Gibson's original concept of affordances is not of much help in capturing the social norms. Yet the sociocultural take on affordances that has been developed by Costall (1995), Heft (1989), Hodges and Baron (1992) and more recent authors (e.g., Rietveld & Kiverstein, 2014; Van Dijk & Rietveld, 2017) can do some work here. As mentioned in the first section of this chapter, these authors have stressed that although each and every object affords a myriad of actions, there is generally a way in which an object *ought* to be used within *our social practices*. Chairs afford standing upon, cutting in pieces, jumping from, and many more actions, but they *are for sitting on* within our culture. That is their "public" meaning (Morss, 1985). Hence, by "socializing affordances" (Costall, 1995), one captures the social norms and conventions, allowing us to judge that a certain action is inappropriate. As an example, a person who climbs on her chair in an upscale restaurant and jumps on the table is actualizing affordances, but not the "canonical" ones (Costall, 1997). This person is *mis*behaving.

A final reason for why affordances deserve a place in an affective Gibsonian psychology is the role they often have in psychotherapy. Especially in the initial stages of the therapeutic process, many clinical psychologists try to show their clients that the situations they struggle with in their lives do not afford any danger. A spider, a critical audience, missing a flight, an angry boss, a divorce, not getting much respect from your colleagues, being fired. Adults do not have to avoid such situations at all costs. Yet the clients lying on the psychologist's sofa generally feel otherwise, at least with respect to the situations in their lives they struggle with. Hence, in some important ways, the goal

of psychotherapy is to bring people to the point where they *perceive and feel what the concrete situations in their lives afford*. But the suffering they often experience, the struggles they generally have, and the strong emotional reactions that are prompted over and over again before they reach that point, prove once more that they generally do not regulate their behavior with respect to the affordances in their environments but with respect to its invitations.

6

DEVELOPMENTAL SYSTEMS THEORY

Bridging the gap

In Chapter 4, I have introduced the thinking of Alice Miller. Although I endorsed her view of the significance of childhood experiences and their effects on adult emotional life, I was reluctant to accept her overall theoretical framework. Indeed, and as we have seen, she criticized Freud but retained his representationalist perspective—she too believed in repressed feelings that are stored in the inner container but have their effects on our day-to-day living. In the final section of Chapter 4, I have already made some first steps in cleansing Miller's theory of this representational line of thinking, drawing on a phenomenological perspective on the effects of traumas. In this chapter I will argue that developmental systems theory provides a framework that allows us to understand how the past is alive in the present—it can explain why the same pattern in the ambient array means different things to different people; why it solicits one emotional response in one person, and another emotional response in someone else. Moreover, developmental systems theory is in keeping with many tenets of the Gibsonian approach (e.g., Ingold, 2000; Turvey, 2009, 2019; Wagman & Miller, 2003; Withagen & Van Der Kamp, 2010). Hence, this theory is likely to have the potential to bridge the gap between Miller's insights and the ecological approach that I am advancing in this book.

I will begin this chapter with a brief history of developmental systems thinking. Then, I turn to two authors who have made significant contributions to this approach: Gottlieb and Oyama. Adopting

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some new techniques that became available in the 1960s, Gottlieb empirically demonstrated that (prenatal) experience is essential for the development of species-typical perception and action. His studies fostered the idea that traits are not innate but "developmentally constructed" (Oyama, Griffiths, & Gray, 2001, p. 4) with many factors jointly determining the process. Oyama laid out the conceptual implications of this new line of thinking on development, with special attention to the notion of information. In her view, information should not be reified, it is not stored somewhere (in DNA or the environment), but emerges in the developmental process. The insights of Gottlieb and Oyama can show, at a conceptual level, how developmental history (including childhood experiences) constitute our adult emotional lives without assuming that experiences are stored somewhere inside the system (as Freud and Miller did).

A brief history of developmental systems thinking

Developmental systems thinking finds its origin in an early critique of the distinction between instinctive and acquired behavior (e.g., Johnston, 1987). Around 1900, the concept of instinct held sway over biology and psychology alike. Darwin (1874/1998) had used the concept to explain animal behavior, and suggested that humans too are governed by them, although "man, perhaps, has somewhat fewer instincts than those possessed by the animals which come next to him in the series" (p. 68). In his *Principles of psychology*, James (1890/1950) wrote a whole chapter about instincts, developing a rather physiological conception of them (see Dunlap, 1919). In fact, he equated them basically with reflexes: "[T]hey are called forth by determinate sensory stimuli in contact with the animal's body, or at a distance in his environment" (James, 1890/1950, p. 384). And some decades later, Freud (1920/1989) emphasized that nearly all of our behavior originates from (tensions between) a sex and a death instinct.

In the 1920s, Kuo (1921) and Carmichael (1925), among others, argued strongly against the way psychologists had used the concept of instincts (see also Dunlap, 1919; Wells, 1922). Carmichael's main targets were Thorndike and Woodworth who considered instincts to be innate, fixed patterns of behavior that are specified by chromosomes. Indeed, in their view, instinctive behavior is clearly distinct from learned behavior, both in terms of its flexibility and its origin. Carmichael (1925) accused these psychologists of having a

rather limited understanding of biology in general and developmental processes in particular. "The part played by the chromosomes […] is *not* settled beyond all doubt by the biologists, as certain psychologists seem mistakenly to believe" (Carmichael, 1925, p. 250; emphasis in original). Carmichael already reported several findings from biological experiments that show how vital the environment is for the development of traits, arguments that have been repeated over and over again by developmental systems thinkers. Relying on Wells' (1922) overview, he mentioned, for example, Stockard's (1909) intriguing study of the "magnesium embryo". In this experiment, Stockard showed that whether the fish Fundulus will have paired eyes or a single median (cyclopean) eye depends on the nature of the salt solution it grows up in. And Carmichael cited some other studies (of other species) that found that light and humidity can determine the course and, thus, the 'outcome' of the developmental process. Apparently, there is no such thing as a pure 'innate' trait. This led Carmichael (1925, pp. 257–258; emphasis in original) to conclude that:

> *The fact as it appears to the present writer is that no distinction can be expediently made at any given moment in the behavior of the individual, after the fertilized egg has once begun to develop, between that which is native and that which is acquired.* […] The individual at all times is a biological unit, and this single organism cannot be considered as part inherited structure, and part environmentally determined structure.

Yet despite the clear experimental findings and the compelling theoretical arguments, the concepts of nature and nurture prevailed. In the 1930s and 1940s, the ethologists Lorenz and Tinbergen set up influential research programs centered around the distinction between innate and learned behavior. In his seminal book *The study of instinct*, Tinbergen (1951/1955) claimed that "[i]nnate behavior is behavior that has not been changed by learning processes" (p. 2). And he suggested that ethologists should "find out to what extent the changes in the behavior during individual development are merely due to growth and to what extent they are due to learning processes" (p. 129).

To determine whether a certain behavior was learned or innate, typically deprivation studies were conducted—from an early age the animal could not practice the behavior of interest and was deprived of seeing others performing it. The logic of this methodology was that if

the behavior would develop in the absence of these experiences, then the behavior will be innate, that is, genetically specified. Tinbergen (1951/1955, p. 132) referred, for example, to Grohmann's (1939) study of the development of the flight behavior of pigeons. In this study, one group of pigeons was put in narrow cages that prevented them from flapping their wings, the other group was free to move. Yet at the age when the noncaged pigeons could fly, the caged ones could do so as well, and to a similar degree.

In a famous critique of Lorenz's theory of instinctive behavior, Lehrman (1953) criticized this line of thinking. Although his paper includes many arguments, for the present purposes two are particularly relevant. First, Lehrman (1953, p. 343; emphases in original) criticized the logic of deprivation or what he called "isolation" experiments:

> It must be realized that an animal raised in isolation from fellow-members of his species *is not necessarily isolated from the effect of processes and events which contribute to the development of any particular behavior pattern*. The important question is not 'Is the animal isolated?' but '*From what* is the animal isolated?'

Second, Lehrman vigorously argued that calling a behavior innate is simply labeling it instead of explaining its development. Even worse, "it leads us *away* from any attempt to analyze its specific origins" (Lehrman, 1953, p. 344; emphasis in original)—it obscures the complexity of the developmental process and all the factors involved.

Interestingly, in formulating their points of critique, Kuo, Carmichael, Lehrman, and Schneirla, among others, advanced a new way of thinking in which the tenets of developmental systems theory emerged (e.g., Gottlieb, 1992/2008; Johnston, 1987, 2001). By ceaselessly pointing to the complexity of the developmental process with all the factors involved, Lehrman (1953, p. 344; emphases in original), for example, made a plea for studying relationships and processes:

> We may ask whether experiments based on the assumption of an absolute dichotomy between maturation and learning ever really tell us *what* is maturing, or how it is maturing? When the question is examined in terms of *developmental* processes and relationships, rather than in terms of preconceived categories, the maturation-versus-learning formulation of the problem is more or less dissipated.

Moreover, the early critics already stressed the continuous development of organisms over time. But although they moved toward a systems perspective, they did not yet adopt its terminology (Johnston, 2001). It took about another decade before these steps were taken.

Gottlieb's probabilistic epigenesis

Among the authors who made these steps was the American biologist Gilbert Gottlieb. His work is impressive, especially if you take the intellectual context in which he developed his ideas into account. Gottlieb set forth his framework at a time when DNA was just discovered, strengthening the vast majority of biologists in their belief that nearly every trait of an animal is specified by the genes. As his son (M.S. Gottlieb, 2007, p. 200) put it in an in memoriam:

> Now imagine living in a time in which the popular press and sound-bite media perpetuate the idea that genes and genetic code are responsible for everything. This was the tenuous environment in which my father, Gilbert Gottlieb, was inspired to put forth novel concepts to explain epigenetic development.

What Gottlieb mainly took aim at was the theory that he referred to as *predetermined epigenesis*. According to this theory, development is essentially an invariant unfolding of different structures that are specified beforehand in the genes. That is, there is a unidirectional relation between genes, structure, and function—genes give rise to anatomical structures that allow the animal to function. According to this theory, the activities of the animal, and the ensuing experiences, do not influence the developmental process. Indeed, the process is relatively encapsulated with DNA serving as "a set of instructions" (Mayr, 1992, p. 128) that specify the developmental process.

Already at graduate school, Gottlieb questioned this approach (see Gottlieb, 2001, p. 41). In his view, the theory of predetermined epigenesis basically follows the logic of preformation that I have discussed in Chapter 1 (see also Griffiths & Tabery, 2013; Oyama, 1985/2000). Granted, proponents of this theory do not hold that there are miniatures of men and women residing in either the egg or the sperm. Yet they do state that the design of the adult animal is already encoded in the DNA and, thus, *preexists* the developmental process to which it is supposed to give rise. Moreover, and relatedly, Gottlieb already

gained the impression that the whole nature–nurture debate rests on a mistaken view of "the relations among heredity, development, and evolution, or, more specifically, the relationship of genetics to embryology" (Gottlieb, 1992/2008, p. 137).

Interestingly, Gottlieb developed a research program that allowed him to empirically study the effects of prenatal experiences on the development of ducklings. In one of his first studies, he found that ducklings that were deprived of maternal assembly calls before hatching could still identify this call after they came out of the egg. Especially at that time, many biologists would take this result as evidence for the claim that this duckling's capacity is innate—it develops independently of the experiences of the duckling. But Gottlieb was reluctant to draw that conclusion. Indeed, he continued examining whether certain prenatal experiences of the ducklings contribute to the development of this capacity. Together with Vandenbergh, Gottlieb invented a method to devocalize the embryo without affecting its health and the overall developmental process. By applying a "nontoxic substance", the essential membranes are "rigidified" such that the embryo could not vocalize anymore (Gottlieb & Vandenbergh, 1968, p. 307). And Gottlieb showed that this had a significant impact on the duckling's capacity to recognize the maternal assembly call—ducklings that could vocalize were capable of making a distinction between the mallard maternal and the chicken maternal call; ducklings that were devocalized were incapable of doing so. Apparently, prenatal experiences matter to the development of the duckling's perceptual capacities. This led Gottlieb (1971, pp. 156–157; quoted in Gottlieb, 2001, p. 45) to conclude:

> As we move into an era of increasingly sophisticated analyses of the development of behavior, it will not be altogether surprising to find that normally occurring sensory stimulation or motor movement is essential to the normal threshold, timing, and perfection of behavior conventionally regarded as instinctive or innate. If this prediction turns out to be correct, the nature-nurture controversy may all but evaporate, and a consensus will have been reached on the idea that structure only fully realizes itself through function.

To capture the gained new insights, Gottlieb replaced the theory of predetermined epigenesis with his theory of probabilistic epigenesis.

This latter theory holds that development is not a process that is characterized by invariance as the former theory suggests. Rather, the development of structure and behavior depends on multiple factors that jointly determine the course, rendering development probable rather than certain. In addition, Gottlieb emphasized the bidirectional influences of structure and function. According to his theory, behavioral development is the result of the dynamic interplay of genetic, neural, behavioral, and environmental factors. Genes do not simply give rise to structures that allow the animal to function, but experiences, activity, and the environment can also have an effect on neural and genetic factors. Note that the earlier discussed 'magnesium embryo' that develops paired eyes or a single median eye, depending on the environment it grows up in, is in keeping with Gottlieb's framework. And as discussed in a later section, the same holds true for Miller's observations that childhood experiences can have a lifelong effect on adult emotional life. However, for now a few general aspects of Gottlieb's perspective, and developmental systems theory in general, need to be emphasized.

One of the central ideas of developmental systems theory is that of distributed control. Just like ecological psychologists argued against the dominant idea that behavior is controlled by the brain (e.g., Gibson, 1979/1986, p. 225), developmental systems theorists took aim at the widely-held assumption that genes control development. Genes are certainly one of the many factors involved in the developmental process, but they are not the prime mover of it, and, thus, do not have explanatory priority over the other factors. There is a host of interpenetrating factors, spread across the animal–environment system, that *jointly* determine the process.

Another key point of developmental systems theory, and one that it also shares with the ecological approach, is the contention that animals are integrated wholes that *develop over time*. To reiterate one of Ingold's (2007) claims: "[O]rganisms do not so much *exist* as *occur*" (p. 117; emphases in original). Indeed, they are historical entities—there is a continuous development from conception till death. Moreover, at each stage the organism is the result of the history of previous coactions of the developmental factors involved. As Griffiths and Tabery (2013) once stated, "development at each stage builds on the results of development at an earlier stage. The components produced by interaction at one stage of development are the components that do the

interaction at a later stage" (p. 82). In addition, and as entailed by this very idea, how the organism responds to a certain factor at a certain moment in time depends on its developmental history. Although this may remind one of the claims made by Freud and Miller—childhood experiences affect our adult emotional lives—there is a fundamental difference between their views and developmental systems theory in how history has this effect. Whereas the psychoanalysts assumed that childhood experiences have their enduring effects because they are *stored inside the person*, developmental systems theorists discard this line of thinking—there is no such *storage of information*. To come to grips with this idea, we have to turn to Oyama's work.

Oyama's relational conception of information

Oyama's (1985/2000) landmark book *The ontogeny of information* is not only laced with arguments against the persisting dichotomies in thinking about development, but also sets out important conceptual implications of developmental systems theory. She coined her view "constructive interactionism", but this is a bit of a misnomer (see also Lewontin, 2000; but see Oyama [2001] for a response). Traditionally, interactionism states that the factors that interact are self-contained entities. A classic example is billiard balls that can enter into causal relationships but exist independently of each other.

But in her work, Oyama rejected this traditional interactionism that has gripped much biological (and psychological) thought for centuries. In fact, she followed and developed a mutualist perspective. A fundamental premise of this metatheory is that the factors that jointly determine a process do not exist independently of one another, but are interdependent (e.g., Heft, 2012). This mutualist line of thinking, which was key to Dewey's philosophy and Gibson's ecological psychology, is foundational to Oyama's perspective as well. As Lewontin (2000, p. xiii) once summarized some empirical data on which Oyama's framework rests:

> [W]e know that a given amino acid sequence does not have a unique folding pattern, but may reach different local free energy configurations depending on the cell milieu in which it folds. More radically, we know that a particular stretch of DNA has alternative reading blocks, depending of the reading machinery

> of the cell, so that the same sequence of DNA may contain several different overlapping or included 'genes'. What is a 'gene' is determined in some as yet mysterious way by the cell machinery.

That is, gene and its environment define each other. The environment determines what constitutes a gene; and conversely, a gene determines what constitutes its environment. Hence, unlike billiard balls, gene and environment cannot be defined outside of their relation.

This fundamental idea runs through Oyama's work. Moreover, Oyama stressed that what a certain factor *does* depends on the developmental process it is participating in at that very moment in time. For example, the influence of a sequence of DNA depends on the process it is facilitating. Oyama asserted that this very fact implies that information should not be reified. It does not preexist in the genes (or in the environment), waiting to impose the encoded form onto the matter. Rather, genes are relatively inert organic molecules, and the function they have can only be understood relative to the developmental process they are part of.

Although Oyama rejected the dominant idea that genes (and the environment) *contain* information, she did defend a conception of information, and one that does a better job in allowing us to understand development. She followed Bateson's (1972/2000) idea that information is "a difference which makes a difference" (p. 315). However, by pointing to the functional outcome, *and* stressing the developmental process it is contingent upon, she asserted that information has to be understood relationally. It does not preexist the process, but emerges out of it. As Oyama (1985/2000, p. 26; emphasis added) once put it almost poetically:

> Chromosomal form is an interactant in the choreography of ontogeny; the 'information' it imparts or the form it influences in the emerging organism depends on what dance is being performed *when, where, and with whom*. The dance continues throughout the life cycle, and everything that occurs in that cycle, from the first moments to the moment of death, from the most permanent structure to the most evanescent, from the most typical feature to the most divergent, is constructed from these interactants.

This relational conception of information allows us to understand why the same chromosomal form (or any other factor involved in the

developmental process) can have different effects on different animals, or on the same animal at different moments in time. Indeed, it captures the context sensitivity—"the significance of any one cause is contingent upon the state of the rest of the system" (Oyama, Griffiths, & Gray, 2001, p. 2)—and thus, the individuality and the historical contingency of the development process. After all, the state of each development system is unique at each moment in time, *and* the result of the developmental history of that system. Hence, Oyama's framework allows one to understand the effect of previous experiences without assuming that these are stored as information inside the system. Rather, the *information that emerges in the ensuing development process is contingent upon them*.

Can developmental systems theory bridge the gap?

With this developmental systems perspective in place, we can address the pertinent question of whether this theory can bridge the gap between Miller's insights into the significance of childhood experiences and the ecological framework that I have advanced in the previous chapters. Does it provide the much-needed story of how childhood injuries can be alive in the present without being stored as information inside the (unconscious) mind? And is this perspective in line with the other ideas and concepts that I have forwarded in previous chapters?

Miller's perspective and developmental systems theory

It almost goes without saying that Miller's insights into the effects of childhood experiences are fully in line with developmental systems thinking. In fact, her insights buttress this perspective—they show how formative experiences are for the development of the behavior of an individual. Just like Gottlieb demonstrated that the prenatal experiences of ducklings are essential for identifying the maternal assembly call later in life, Miller pointed to the significance of childhood experiences (and meeting the children's many needs) for the healthy emotional functioning of adults. Combined with Jenson's account of the defense responses, it even provides a relatively detailed account of what the effects of childhood injuries are. Hence, it supports the contention that humans are "developmentally constructed" (Oyama, Griffiths, & Gray, 2001, p. 4) with experiences playing a vital role in the overall development.

There are, however, some important differences between Miller's approach and developmental systems theory. One has to do with methodology. Gottlieb and colleagues could perform highly controlled experimental studies in which the effects of certain experiences (or a lack thereof) could be systematically studied. With children such studies are of course not possible. Although the consequences of separation from the mother have been examined in observational studies (see e.g., Bowlby, 1969/1972), such studies lack the rigor of true experimental research. But, of course, no ethical review board will approve experimental studies in which children are exposed to 'controlled interventions' that are supposed to harm them. And rightly so. Although Miller mentioned several observational studies of the effects of childhood injuries in her work (e.g., Miller, 1988/1991b, p. 3), she developed her perspective primarily by listening to the stories of her many clients, and digging deep into the lives of the persons whose psychobiographies she was writing. Yet, especially when backed up with observational studies, this collection of stories can also inform a perspective—it, too, can reveal regularities, despite the fact that not all the relevant variables are controlled. Second, and more importantly for the present purposes, Miller's perspective and developmental systems theory vary in how they account for the effects of previous experiences. As we have seen in Chapter 4, Miller adopted a cellar theory, assuming that the painful childhood experiences are stored inside the system, like olives in a can. However, because this representationalist idea is not a central element of her perspective (see Chapter 4), I think we can easily replace it with the theory that the developmental systems perspective provides. That would make it suitable for an integration into the ecological perspective that I try to develop. However, and as I will lay out in the next section, this solution comes at the cost of rejecting the traditional Gibsonian conception of information.

Relational information or how the cellar theory can be dispensed with

From the very inception of their perspective, ecological psychologists have studied learning and examined the role of experience in that process. As set out in Chapter 2, already in the 1950s, the Gibsons (Gibson & E.J. Gibson, 1955) forwarded the theory of perceptual learning as differentiation. And to set their theory apart from representationalist

accounts, they were quick to point out that the effect of experience is not the result of "the *storage* of past experiences" (Gibson, 1966, p. 262; emphasis in original). Over the decades that followed, ecological psychologists have carefully put forth metaphors to foster this new way of thinking. Michaels and Carello (1981, p. 78; emphases in original), for example, compared learning with evolution:

> If it is assumed that evolution leads to a *new* biological machine that is better suited anatomically and physiologically to the environment than its predecessors or extinct cousins, we might also assume that personal experiences lead to a new machine that is better suited to its particular, personal environment. It is better able to detect the environment's affordances. In this analysis, the consequence of personal experience is not that the old animal has new knowledge, but *that it is a new animal that knows better*.

Although this comparison is insightful, I think ecological psychology can provide a more detailed and compelling story of the effects of personal experiences when it incorporates some insights of the developmental systems perspective. Indeed, the latter can show how past experiences can have an effect on the developmental trajectory, without falling back on representationalist ideas. For example, Gottlieb's ducklings experienced their embryonic vocalizations which contributed to the development of their auditory capacities. But the fact that the maternal call can be identified after hatching is not the result of *the storage of these embryonic experiences.* Rather, the latter simply affected the developmental process resulting in a certain functioning of the organism.

As I have argued elsewhere (Withagen, 2018), this developmental systems perspective can also be applied to the emotional development of individuals. The personal experiences affect the developmental process with each experience having its unique effect that is determined by the developmental process it is affecting at that moment in time. None of the experiences are stored as information inside the (unconscious) mind—they simply affect the course of the ongoing development resulting in uniquely functioning individuals. Importantly, this is not to deny that we can remember past events. We obviously can. But this remembering does not have to be the result of the *storage of information* that is retrieved at a later stage. Although it is a bit of a neglected

topic in Gibsonian psychology, one can develop an ecological perspective that conceives remembering as an information generating rather than an information retrieving process. But I will leave the development of that idea (and its relation to the therapeutic process) for another occasion (Withagen, in preparation). What is most important for now is that the individual's developmental history determines what certain events (and the accompanying patterns in the ambient arrays) *mean* to the person in question at a later point in time, thus accounting for her emotional reaction. As I (Withagen, 2018, p. 25) put it in an earlier paper:

> [W]hat the detection of the pattern [in the ambient array] does is a joint product of the pattern and the developmental history of the person who is affected by it. Just like the function of the chromosomal form depends on 'what dance is being performed when, where, and *with whom*' (Oyama, 1985/2000, p. 26; emphasis added), so it is with patterns in the ambient array.

Thus, this view entails that two persons with different developmental histories can respond differently to the same pattern in the ambient array. That is, by applying Oyama's relational conception of information to the perceptual realm and our affective engagement with the environment, we can explain not only the effects of developmental history without introducing an inner container packed with experiences, but can also account for the individual differences in our emotional reactions to certain events.

Note, however, that adopting Oyama's conception of information implies a significant break with the traditional Gibsonian framework. As we have seen in a previous chapter, in his ecological optics, Gibson defined information relative to a point of observation in the environment. That is, his account centralized the relation between the pattern in the ambient array (or flow) and the environmental structures. The information is 'out there' in the environment, and although we do create patterns and flows in the ambient energy arrays in our engagement with the environment, the information these patterns and flows 'contain' is independent of us.

Over the last decades, Gibson's conception of information has been frequently criticized, also from within the ecological community (e.g., Bruineberg, Chemero, & Rietveld, 2019; Chemero, 2009; Jacobs & Michaels, 2007; Withagen, 2004). However, the focus of many

critics has been on the premise of specification on which Gibson's conception rests (but see Costall, 2003; Johnston, 1997; Van Dijk & Kiverstein, 2021). Chemero (2009), for example, argued that for a pattern to carry information about the environment, it does not have to relate one-to-one to it, as the specification principle dictates. Also nonspecifying variables, patterns that correlate with the environment, are informative—such variables can also be used in the perceiving of and acting in the environment. Note, however, that in this alternative ecological account, information is still defined as a relation between patterns in the ambient array and the environment—the perceiver is again sidelined. And it is this conception of information that I have also defended myself till 2010, closely along the same lines (Withagen, 2004; Withagen & Chemero, 2009; but see Withagen and Van Der Kamp [2010] for a relational account that I have defended ever since).

However, if we want to understand our emotional behavior, we have no option but to adopt a relational conception of information, very much along Oyama's lines, in which the perceiver with its unique developmental history is taken into account. There is no other avenue for accounting for our affective engagement with the environment (and the individual differences therein) in a nonrepresentational way. As far as I can see it, any other account has to assume that perception and emotion are (partly) the result of "stored, associated information" (Frijda et al., 2014, p. 3).

Dewey's theory of emotions and the relational concept of information

Another reason for embracing developmental systems thinking in general, and the relational conception of information in particular, is that it befits Dewey's theory of emotions. We have seen that Oyama followed mutualism in her account—the factors that are involved in the developmental process are interdependent, they define each other. This idea was foundational to (and significantly furthered in) Dewey's philosophy and psychology (see e.g., Dewey & Bentley, 1949), including his theory of emotions. Indeed, long before Oyama (1985/2000) laid out her relational conception of information, Dewey argued that the 'stimulus' does not exist prior to the 'response' but grows out of the activity the animal is already engaged in. To reiterate a quote from Dewey that was included in Chapter 3, "what proceeds the 'stimulus' is a whole act, a sensori-motor coördination. What is

more to the point, the 'stimulus' emerges out of this coördination" (Dewey, 1896, p. 361). And the very same point was made a year earlier in Dewey's second paper on emotions. Discussing an incongruity in James' account, Dewey (1895, p. 20; emphasis added) stated:

> The reaction is not made on the basis of the apprehension of some quality in the object; it is made on the basis of an organized habit, of an organized coördination of activities, one of which instinctively stimulates the other. The outcome of this coördination of activities *constitutes*, for the first time, the object with such and such an import—terrible, delightful, etc—or constitutes an emotion referring to such and such an object.

Hence, just like a gene does not preexist the process it participates in, so it is with the objects of emotions. The bear is not frightful prior to the emotion of fear, but is an integral part of the emotion.

Invitations and developmental systems thinking

The developmental systems perspective can also further the theory of invitations. As suggested in one of the previous sections, it can explain in a nonrepresentational way why the same event, organism, or object (and the accompanying patterns in the ambient arrays and flows) mean different things to different persons. After all, what these patterns do and, thus, *mean*, depend on the process it is facilitating. Note that this explanation keeps us far from introducing mental theaters to account for behavior in general and individual differences in particular. Indeed, by taking information (and meaning) to be fundamentally relational, the idea of a mental world residing in the head is jettisoned.

In addition, the developmental systems perspective can elucidate the dynamics of invitations. As mentioned in Chapter 5, several authors have suggested that affordances emerge *in* the action. Shotter (1983), for example, claimed that an affordance does not exist 'out there' in the world waiting to be discovered by the animal, but that "an affordance is only completely specified *as the affordance it is* when the activity it affords is complete" (p. 27; emphasis in original). Although I am completely on board with the idea that the environment we live in is largely (if not completely) the result of our own activities (e.g., Costall, 1995; Heft, 2007; Van Dijk, 2021a; Withagen & Van Wermeskerken, 2010), and that affordances emerge when people gather together (as

in a party; see Heft, 2001), I have always been reluctant to accept this position as a universal principle. In my view, it makes perfect sense to say that a chair affords sitting for me before I start doing so. Granted, there are certainly some dynamics to that affordance. When I lose the ability to bend my legs, or when the legs of a chair have become fragile due to the activities of a collection of woodworms, then the chair no longer affords sitting for me. But these changes do not typically occur at the timescale of an individual action (i.e., my sitting down). Hence, in my view, the sit-on-ability of the chair is completely specified before the action of sitting is completed.

However, and as already mentioned in Chapter 3, for invitations it is different. After all, an environmental situation can only solicit a response if the animal is in perceptual touch with it. And because perception is an activity, invitations are necessarily contingent on our actions. Moreover, whether an environmental situation solicits an action depends on a multitude of factors that vary over time and do so at different timescales. Water may afford drinking during the whole day, but whether it solicits this behavior depends on the state of the person which is influenced by many factors (e.g., temperature, humidity) including the activities the person is or has been engaged in (e.g., a serious hike in the Alps, eating salty crisps). Moreover, and relatedly, invitations are often occasion specific. For example, on Monday mornings, a harmonious Nebbiolo wine does not solicit drinking for me. But it does so on many Friday nights, especially after a serious day of writing. And there is a seasonal influence to this as well—in wintertime, this wine attracts me more than on a hot summer day.

Note that this developmental system perspective on invitations can also explain the "'coloring' of experience" (Gibson, 1972/2020, p. 410) by emotions and moods. Certain states of the organism (or more precisely, the organism-environment system) determine what a certain pattern in the ambient array means at a certain moment in time. Hence, it can account for the fact that the lived world is "transformed" while being in a certain affective state (Lambie, 2020). Or that a traumatic experience can "totalize" (Dreyfus & Wakefield, 1988/2014, p. 173) the lived world of a person, stabilizing the meaning certain patterns in the ambient array have.

Hence, to further the theory of invitations, adopting a developmental systems perspective is a promising way to go. Indeed, it provides a theoretical framework that can elucidate how invitations emerge out of a host of interdependent and interpenetrating factors

that evolve over time. That very "choreography" (Oyama, 1985/2000, p. 26) determines what (the detection of) a pattern in the ambient array or flow means to an animal at a certain moment in time, and, thus, what affective action is solicited and performed.

Conclusion

Let us go back to the central question of this chapter: Can developmental systems theory bridge the gap between Miller's insights into the effects of childhood experiences and the ecological framework that I have advanced in previous chapters? Based on the previous sections, I think we have to conclude that the answer is yes—developmental systems thinking organically weaves all the lines of thinking that meander through this book into a coherent framework. It shares many assumptions with Gibson's ecological approach, it is in line with Dewey's theory of emotions, it can further the theory of invitations, it can easily accommodate Miller's insights into the significance of childhood experiences, and it offers a genuine nonrepresentationist story of how the past is alive in the present. However, by accepting the developmental systems conception of information we have to give up on Gibson's traditional concept. Indeed, applying Oyama's relational conception of information to the perceptual realm entails that the meaning of a pattern in the ambient array is not determined by its relation with the environment but by the process it is facilitating. Some ecological psychologists might consider this to be a price too high. Yet the benefits of replacing the traditional conception of information with such a relational account are great. Indeed, the proposed relational account allows us to do full justice to the lived experiences of people *by taking their developmental histories into account*. The traditional Gibsonian conception of information is not capable of doing either of these.

EPILOGUE

In the previous chapters, I have sketched in bold strokes an ecological approach to our inherently affective relationship with the environment. However, while reading the second half of the monograph, one might have wondered whether the title of this book captures the theoretical framework that I have developed—to what extent is this still Gibsonian psychology? Along the way I have indeed jettisoned several central pillars of Gibson's ecological approach. I have argued that we, and other animals, do not regulate our encounters with respect to the action possibilities in our environment (nor with respect to the field of soliciting affordances). Rather, the lived environment is best conceptualized as a field of invitations—the world affects us in a variety of ways, and a psychologically meaningful description of the environment should capture those meanings. In addition, I have rebelled against Gibson's concept of information. Although I am on board with the Gibsonian idea that perception is a process in which animals detect rich patterns in the ambient arrays and flows, I have suggested that information is not 'out there' in the environment but should be defined relative to the process it is facilitating. What a pattern in the ambient array means at a certain moment in time depends on the state of the specific animal (with its unique developmental history) that is detecting it.

Yet the reason for labelling my framework a Gibsonian psychology was threefold. First, in this book, and in all of my work, I take Gibson's

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perspective as my point of departure. Although I have used insights from several other perspectives (i.e., phenomenology, developmental systems theory, psychoanalysis), Gibson's work served as the foundation. Within *psychology*, Gibson's framework has arguably been the most powerful attempt to overcome the mechanistic tradition that held, and unfortunately still holds, the discipline captive. Hence, if one aims at developing a nonmechanistic psychology, as I do, Gibson's ecological approach is a natural starting point.

Second, I have followed Gibson's approach to come to grips with our emotional lives. Gibson has built up his theory of perception "almost entirely from the environment" (Varela, Thompson, & Rosch, 1991/2016, p. 204). And this is also the approach that I have pursued in the present book—I have developed an ecological approach to emotions starting from an analysis of what our lived environment consists of. It is not a collection of causes (as Descartes argued), nor a manifold of action possibilities (as Gibson stated), but a field of invitations that change over time. In my view, this building up psychological theories from the environment is exactly what psychology needs to do. Our lives always take place in a certain environment, and we do well to capture its nature first. This is all the more true because psychology has originated from and has been based on a mistaken view of the nature of the environment: meaningless matter in motion. In Chapter 1, we have seen how this mechanistic conception of the environment has put psychology on the wrong track. That is, adequate psychological theorizing requires an appropriate conception of the environment.

A third, and related, reason for calling my perspective a Gibsonian one is that I have embraced the principle of mutualism. Animal and environment define one another, and we, thus, have to centralize their relationship in all of our psychological inquiries. Although the principle of mutualism has been pursued before in several academic disciplines, I first came across this line of thinking in Gibson's work when he discussed the concept of affordances. And this is where I found the inspiration to develop a mutualist psychology. I would like to end this book with a brief examination of the role of mutualism in ecological psychology, making a final plea for this metatheory in studying behavior.

Mutualism and/or realism

In Chapter 2, I have described Gibson's ecological perspective as a coherent and consistent framework. However, there are serious tensions

in his perspective as I have discussed in the chapters that followed. On the one hand, Gibson was pushing the principle of mutualism as a genuine alternative to the animal–environment dualism that had gripped much psychological theorizing. The introduction of his concept of affordances offers arguably the best case in point. To reiterate a quote from Gibson (1979/1986, p. 129; emphasis added):

> [A]n affordance is neither an objective property nor a subjective property; or it is both if you like. *An affordance cuts across the dichotomy of the subjective-objective and helps to understand its inadequacy.* It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither.

And Gibson was abundantly clear that the principle of mutualism was fundamentally different from interactionism. "The relation between the animal and its environment is not one of *interaction* in any sense of that word that I understand […] it is one of, well, reciprocity is not too bad" (Gibson, 1982, p. 234; quoted in Costall, 1995, p. 475). Indeed, animal and environment are not self-contained entities that enter into causal relationships; rather, they define and co-constitute one another.

Yet, Gibson could never completely let go of realism. In his first *Synthese* paper, Gibson (1967, p. 162; emphasis in original) presented this perspective as a *consequence* of his theory of perception:

> If *invariants* of the energy flux at the receptors of an organism exist, and if these invariants correspond to the permanent properties of the environment, and if they are the basis of the organism's perception of the environment instead of the sensory data on which we have thought it based, then I think there is new support for realism […].

In later work, however, realism served as a principle that guided Gibson's theorizing. After laying out his revolutionary concept of affordances and the mutualist thinking it rests upon, Gibson made a "remarkable retraction" (Costall, 1995, p. 475), trying to retain a realism about the environment. "The organism depends on its environment for its life, *but the environment does not depend on the organism for its existence*" (Gibson, 1979/1986, p. 129; emphasis added). Gibson's tendency to objectify information is also in keeping with this realist stance. Indeed, he asserted that the information that the patterns in

the ambient arrays and flows 'contain' should be defined relative to a (moving) point of observation and, thus, exist independently of the animals that can occupy this point.

In the decades after Gibson's death, several Neo-Gibsonians have struggled with this tension between realism and mutualism. Reed (1996a, 1996b), for example, took the realism that Gibson remained wedded to seriously. And although Reed's motive for adopting this perspective was noble (it allows us to explain that we share a world that we can experience directly and collectively), it resulted in a problematic evolutionarily inspired perspective (see Costall, 1999; Chemero, 2003; Van Dijk, 2021b; Withagen & Van Wermerskerken, 2010). As we have seen in Chapter 5, Reed conceived affordances as resources that exert selection pressure on the behavior of animals. And although his conception of affordances had a mutualist flavor at some points (e.g., Reed, 1985, p. 360), he typically viewed affordances as *preexisting* the species the evolutionary process will give rise to. This realism about affordances might fit in well with selectionism, a (contested) theory of evolution that Reed advocated, but it is inconsistent with the mutualism that Gibson used as a foundation for his theory of affordances (Costall, 1999).

Overall, I think that the commitment to realism has done more harm than good to the ecological movement. Not only did it hinder the full implementation of the principle of mutualism, but it also resulted in a serious struggle to account for certain phenomena. If you start from the assumption that animals know (and perceive) their environments (e.g., Michaels & Carello, 1981; Shaw, Turvey, & Mace, 1982), illusions and misperceptions are anomalies. And although the ingenuity in dealing with these phenomena from the realist perspective has been impressive, it sometimes resulted in ecological psychologists explaining illusions and perceptual errors away. As we have seen in Chapter 5, Michaels and Carello (1981) argued that in the case of the Müller-Lyer illusion, it is not the perceiver but the scientist who is "*in error*" (p. 92; emphasis added)—"the disparity between some measures of the 'stimulus' and a perceiver's report is due to a confusion on the part of the measurer, between things and information" (p. 93). But by adopting this strategy, ecological psychologists followed a long and problematic tradition in the history of psychology—start with a predetermined model, and if phenomena do not fit in, try to rule them out (e.g., Reed, 1996a, p. 5). This happened, for example, during the mechanization of the worldview. We experience

that we live in a meaningful world, full of colors, smells, sounds, and flavors. Yet, it was argued that this is a mere illusion because there is only meaningless matter in motion 'out there'. And in some important respects, ecological psychologists have occasionally followed the same strategy: Explain away the phenomena that you are uncomfortable with (e.g., Cutting, 1982).

But, obviously, it is psychology's job to take all of our experience and behavior seriously. And I think that giving up on the realist perspective and embrace mutualism as a genuine alternative to it is helpful in this regard. In this book I have followed this strategy. In the final chapters I have made a relatively sharp distinction between what the world affords and what it invites, and I have adopted a mutualist perspective to both. To capture the 'objective' ecological facts, Gibson's original *mutualist* conception of affordances proved useful. Affordances do not preexist animals, but are contingent on their action capabilities, body dimensions, *and* their biological and social needs (see, e.g., Gibson, 1975/2020). For example, I have argued that because of their different needs, certain situations afford harm to a child but not to an adult. In addition, to understand the invitational character of the environment, a mutualist perspective proved necessary as well. Indeed, invitations are in a significant way contingent on the unique developmental history of a person. That history determines how the world shows itself to that person, what certain patterns in the ambient array mean. As we have seen in previous chapters, this mutualist perspective on invitations gives rise to a conception of meaning that can capture the significance of objects and events in a way the concept of affordances is not capable of. To end with a personal experience, it is not just the action possibilities of our tent that determine what it means to us, but also the history my wife and I have with it. It is the tent that provided us shelter during that lovely bicycle trip through Iceland's interior and during that horrible storm in Scotland. And because of this history, we will regret replacing this particular tent, even if the new one is an exact copy and thus provides the same possibilities for action.

One might argue that this perspective results in a kind of subjectivism, and in many ways this is true. Not in the sense that the meaningful world originates in our head, and is, thus, not accessible for other persons. But in the sense that it fully acknowledges the fact that persons vary in their emotional engagement with certain situations, variation onlookers can witness. In my view, this is the kind of

subjectivism that ecological psychology should not be uncomfortable about. Because of our unique developmental histories, we all have our own specific situations that matter to us, and to which we respond in idiosyncratic ways. And this needs to be explained, rather than to be explained away.

In the previous chapters, we have seen that developmental systems theory can further the above line of thinking. Over the last years, several ecological inclined authors have suggested that ecological psychology should join forces with enactivism (e.g., Baggs & Chemero, 2021; but see Heft, 2020), a perspective that was introduced by Maturana and Varela (1987) and developed by several other authors (e.g., Colombetti, 2014; De Haan, 2020; Hutto & Myin, 2013; Thompson, 2007; Varela, Thompson, & Rosch, 1991/2016). However, I think that developmental systems theory is a more natural ally of the ecological approach that I try to advance. Not only is that theory grounded in mutualism too, it also focuses on the *organism-environment system*, the development of which is taken to be the result of a host of interdependent and interpenetrating factors that spread across that system (e.g., Oyama, 2011; Wagman & Miller, 2003). Moreover, developmental systems theory can explain rather profoundly how parts of the system define one another (e.g., why certain patterns in the ambient array mean different things to different people), and how the past manifests itself in the present without being stored as information (experience) inside the system. I hope that the present book has convinced at least some readers of the value of the sketched ecological approach to our emotional engagement with the environment. And in the long run, I hope that this perspective can be advanced into a much-needed new psychology that does full justice to all the other significant aspects of our lives.

REFERENCES

Ackrill, J.L. (1981). *Aristotle the philosopher.* Oxford: Oxford University Press.

Adolph, K.E., Eppler, M.A., & Gibson, E.J. (1993). Crawling versus walking infants' perception of affordances for locomotion over sloping surfaces. *Child Development, 64,* 1158–1174.

Anderson, M.L. (2014). *After phrenology: Neural reuse and the interactive brain.* Cambridge: MIT Press.

Arnold, M.B. (1960). *Emotion and personality (Vol. 1).* New York: Colombia University Press.

Bachelard, G. (1958/1994). *The poetics of space.* Boston: Beacon.

Baggs, E. (2015). A radical empiricist theory of speaking: Linguistic meaning without conventions. *Ecological Psychology, 27,* 251–264.

Baggs, E., & Chemero, A. (2021). Radical embodiment in two directions. *Synthese, 198,* 2175–2190.

Bateson, G. (1972/2000). *Steps to an ecology of mind.* Chicago: The University of Chicago Press.

Beek, P., & De Wit, A. (1993). Affordances and architecture. In J.A.G.M. Rutten & J. Semah (Eds.), *The third exile* (pp. 29–44). Amsterdam: Arti et Amicitae.

Bergson, H. (1911/1998). *Creative evolution.* New York: Dover Publications.

Bongers, R.M., Smitsman, A.W., & Michaels, C.F. (2003). Geometrics and dynamics of a rod determine how it is used for reaching. *Journal of Motor Behavior, 35,* 4–22.

Borelli, G.A. (1680–1681/1989). *On the movement of animals.* Berlin: Springer-Verlag.

Bosch, I. (2003/2017). *Illusions: How to escape the labyrinth of destructive emotions.* Zwaag: Pumbo.

Bowlby, J. (1969/1972). *Attachment and loss Volume 1: Attachment*. Harmondsworth: Penguin.

Bril, B., Rein, R., Nonaka, T., Wenban-Smith, F., & Dietrich, G. (2010). The role of expertise in tool use: Skill differences in functional action adaptation to task constraints. *Journal of Experimental Psychology: Human Perception and Performance, 36,* 825–839.

Bruineberg, J., Chemero, A., & Rietveld, E. (2019). General ecological information supports engagement with affordances for 'higher' cognition. *Synthese, 196,* 5231–5251.

Bruineberg, J., & Rietveld, E. (2014). Self-organization, free energy minimization, and optimal grip on a field of affordances. Frontiers in Human Neuroscience, *8*, 599.

Carmichael, L. (1925). Heredity and environment: Are they antithetical? *Journal of Abnormal and Social Psychology, 20,* 245–260.

Chemero, A. (2003). An outline of a theory of affordances. *Ecological Psychology, 15,* 181–195.

Chemero, A. (2009). *Radical embodied cognitive science*. Cambridge: MIT Press.

Colombetti, G. (2014). *The feeling body: Affective science meets the enactive mind*. Cambridge: MIT Press.

Copernicus, N. (1543/1995). *On the revolutions of heavenly spheres*. New York: Prometheus Books.

Costall, A. (1995). Socializing affordances. *Theory & Psychology, 5,* 467–481.

Costall, A. (1997). The meaning of things. *Social Analysis, 41,* 76–85.

Costall, A. (1999). An iconoclast's triptych: Edward Reed's ecological philosophy. *Theory & Psychology, 9,* 411–416.

Costall, A. (2003). From direct perception to the primacy of action: A closer look at James Gibson's ecological approach to perception. In G.J. Bremmer & A.M. Slater (Eds.), *Theories of infant development* (pp. 70–89). Oxford: Blackwell.

Costall, A. (2004). From Darwin to Watson (and cognitivism) and back again: The principle of animal-environment mutuality. *Behavior and Philosophy, 32,* 179–195.

Costall, A., & Morris, P. (2015). The "textbook Gibson": The assimilation of dissidence. *History of Psychology, 18,* 1–14.

Cutting, J.E. (1982). Two ecological perspectives: Gibson vs. Shaw and Turvey. *American Journal of Psychology, 95,* 199–222.

Darwin, C. (1859/1985). *On the origin of species by means of natural selection*. London: Penguin.

Darwin, C. (1872/1998). *The expression of the emotions in man and animals*. London: Fontana Press.

Darwin, C. (1874/1998). *The descent of man*. New York: Prometheus Books.

Darwin, C. (1881). *The formation of vegetable mould through the action of worms with observations of their habits*. London: John Murray.

De Haan, S. (2020). *Enactive psychiatry*. Cambridge: Cambridge University Press.

De Haan, S., Rietveld, E., Stokhof, M., & Denys, D. (2013). The phenomenology of deep brain stimulation-induced changes in OCD: An enactive affordance-based model. *Frontiers in Human Neuroscience, 7*, 653.

De Haan, S., Rietveld, E., Stokhof, M., & Denys, D. (2015). Effects of deep brain stimulation on the lived experience of obsessive-compulsive disorder patients: In-depth interviews with 18 patients. *PLoS ONE, 10*, e0135524.

De La Mettrie, J.O. (1748/1994). *Man a machine*. Indianapolis: Hackett Publishing Company.

Dent-Read, C., & Zukow-Goldring, P. (Eds.) (1997). *Evolving explanations of development: Ecological approaches to organism-environment systems*. Washington: American Psychological Association.

Descartes, R. (1633/1972). *Treatise of man*. Cambridge: Harvard University Press.

Descartes, R. (1637/1998). *Discourse on method*. Indianapolis: Hackett Publishing Company.

Descartes, R. (1637/1999). *Optics*. In J. Cottingham (Ed.), *Selected philosophical writings* (pp. 57–72). Cambridge: Cambridge University Press.

De Vaucanson, J. (1742/1979). *An account of the mechanism of an automaton or image playing on the German-flute*. Buren: Frits Knuf.

Dewey, J. (1894). The theory of emotion: (I) Emotional attitudes. *Psychological Review, 1,* 553–569.

Dewey, J. (1895). The theory of emotion: (II) The significance of emotions. *Psychological Review, 2,* 13–32.

Dewey, J. (1896). The reflex arc concept in psychology. *Psychological Review, 3,* 357–370.

Dewey, J. (1934/2005). *Art as experience*. New York: Perigee.

Dewey, J., & Bentley, A.F. (1949). *Knowing and the known*. Boston: Beacon.

De Wit, M.M., Van Der Kamp, J., & Withagen, R. (2015). Visual illusions and direct perception: Elaborating on Gibson's insights. *New Ideas in Psychology, 36,* 1–9.

Dicks, M., Van Der Kamp, J., Withagen, R., & Koedijker, J. (2015). Can we hasten expertise by video simulations?: Considerations from an ecological psychology perspective. *International Journal of Sport Psychology, 46,* 109–129.

Dijksterhuis, E.J. (1950/1969). *The mechanization of the world picture*. New York: Oxford University Press.

Dings, R. (2018). Understanding phenomenological differences in how affordances solicit action: An exploration. *Phenomenology and the Cognitive Sciences, 17,* 681–699.

Dings, R. (2021). Meaningful affordances. *Synthese*, *199*, 1855–1875.

Drescher, J. (2015). Out of DSM: Depathologizing homosexuality. *Behavioral Sciences, 5,* 565–575.

Dreyfus, H.L. (1991). *Being-in-the-world: A commentary on Heidegger's being and time, division I*. Cambridge: MIT Press.

Dreyfus, H., & Kelly, S.D. (2007). Heterophenomenology: Heavy-handed sleight-of-hand. *Phenomenology and the Cognitive Sciences, 6,* 45–55.

Dreyfus, H., & Wakefield, J. (1988/2014). From depth psychology to breadth psychology: A phenomenological approach to psychopathology. In M.A. Wrathall (Ed.), *Skillful coping: Essays on the phenomenology of everyday perception and action* (pp. 168–182). Oxford: Oxford University Press.

Dunlap, K. (1919). Are there any instincts? *The Journal of Abnormal Psychology, 14*, 307–311.

Fantasia, V., Fasulo, A., Costall, A., & López, B. (2014). Changing the game: Exploring infants' participation in early play routines. *Frontiers in Psychology, 5*, 522.

Fodor, J.A. (1980). Methodological solipsism considered as a research strategy in cognitive psychology. *Behavioral and Brain Sciences, 3,* 63–109.

Foucault, M. (1961/2009). *History of madness*. New York: Routledge.

Freud, S. (1896/1978). The aetiology of hysteria. In J. Strachey (Ed.), *The standard edition of the complete psychological works of Sigmund Freud* (Volume III, pp. 191–221). London: Hogarth Press.

Freud, S. (1900/2020). *The interpretation of dreams*. Chichester: Capstone.

Freud, S. (1920/1989). *Beyond the pleasure principle*. New York: Norton & Company.

Frijda, N.H. (1986). *The emotions*. New York: Cambridge University Press.

Frijda, N.H. (2007/2013). *The laws of emotion*. New York: Routledge.

Frijda, N.H. (2016). The evolutionary emergence of what we call "emotions". *Cognition and Emotion, 30,* 609–620.

Frijda, N.H., Ridderinkhof, R.K., & Rietveld, E. (2014). Impulsive action: Emotional impulses and their control. *Frontiers in Psychology, 5*, 518.

Fryer, D.M., & Marshall, J.C. (1979). The motives of Jacques de Vaucanson. *Technology & Culture, 20,* 257–269.

Fuchs, T. (2007). Psychotherapy of the lived space: A phenomenological and ecological concept. *American Journal of Psychotherapy, 61,* 423–439.

Galileo, G. (1623/2008). *The essential Galileo*. Indianapolis: Hackett Publishing Company.

Gallistel, C.R. (1981). Précis of Gallistel's 'the organization of action: a new synthesis'. *Behavioral and Brain Sciences, 4,* 609–650.

Garden, G. (1691). A discourse concerning the modern theory of generation. *Philosophical Transactions of the Royal Society of London, 17,* 474–483.

Gibson, E.J. (1969). *Principles of perceptual learning and development*. New York: Appleton-Century-Crofts.

Gibson, E.J., & Pick, A. (2000). *An ecological approach to perceptual learning and development*. New York: Oxford University Press.

Gibson, J.J. (1950a). The implications of learning theory for social psychology. In J.G. Miller (Ed.), *Experiments in social process: A symposium on social psychology* (pp. 147–167). New York: McGraw-Hill.

Gibson, J.J. (1950b). *The perception of the visual world*. Boston: Houghton Mifflin.

Gibson, J.J. (1958). Visually controlled locomotion and visual orientation in animals and men. *British Journal of Psychology, 49,* 182–194.

Gibson, J.J. (1959). Perception as a function of stimulation. In S. Koch (Ed.), *Psychology: A study of a science* (pp. 456–501). New York: McGraw-Hill.

Gibson, J.J. (1961). Ecological optics. *Vision Research, 1,* 253–262.

Gibson, J.J. (1966). *The senses considered as perceptual systems*. Boston: Houghton Mifflin.

Gibson, J.J. (1967/2020). Autobiography. In E. Reed & R. Jones (Eds.), *Reasons for realism: The selected essays of James J. Gibson* (pp. 7–22). New York: Routledge.

Gibson, J.J. (1967). New reasons for realism. *Synthese, 17,* 162–172.

Gibson, J.J. (1970). On the relation between hallucination and perception. *Leonardo, 3,* 425–427.

Gibson, J.J. (1971). The legacies of Koffka's *Principles*. *Journal of the History of the Behavioural Sciences, 7*, 3–9.

Gibson, J.J. (1971/2020). Notes on affordances Part IV: Still more on affordances. In E. Reed & R. Jones (Eds.), *Reasons for realism: The selected essays of James J. Gibson* (pp. 407–408). New York: Routledge.

Gibson, J.J. (1972/2020). Notes on affordances Part V: The affordances of the environment. In E. Reed & R. Jones (Eds.), *Reasons for realism: The selected essays of James J. Gibson* (pp. 408–410). New York: Routledge.

Gibson, J.J. (1975). Events are perceivable but time is not. In J.T. Fraser & N. Lawrence (Eds.), *The study of time, II* (pp. 295–301). New York: Springer-Verlag.

Gibson, J.J. (1975/2020). Notes on affordances Part VI: Affordances and behavior. In E. Reed & R. Jones (Eds.), *Reasons for realism: The selected essays of James J. Gibson* (pp. 410–411). New York: Routledge.

Gibson, J.J. (1979/1986). *The ecological approach to visual perception*. Boston: Houghton Mifflin.

Gibson, J.J. (1982). Discussion. In W.B. Weimer & D.S. Palermo (Eds.), *Cognition and the symbolic processes: Volume 2* (pp. 227–239). Hillsdale: Erlbaum.

Gibson, J.J., & Gibson, E.J. (1955). Perceptual leaning: Differentiation or enrichment? *Psychological Review, 62,* 32–41.

Glotzbach, P., & Heft, H. (1982). Ecological and phenomenological contributions of the psychology of perception. *Nous, 16,* 108–121.

Goethe, J.W. (1790/1999). *Die metamorphose der pflanzen*. In M. Böhler (Ed.), *Schriften zur naturwissenschaft* (pp. 70–115). Stuttgart: Philip Reclam.

Goethe, J.W. (1817–1824/1999). *Zur morphologie*. In M. Böhler (Ed.), *Schriften zur naturwissenschaft* (pp. 45–69). Stuttgart: Philip Reclam.

Goldfield, E. (1995). *Emergent forms: Origins and early development of human action and perception*. New York: Oxford University Press.

Gottlieb, G. (1971). *Development of species identification in birds: An inquiry into the prenatal determinants of perception*. Chicago: Chicago University Press.

Gottlieb, G. (1992/2008). *Individual development and evolution: The genesis of novel behavior*. New York: Psychology Press.

Gottlieb, G. (2001). A developmental psychobiological systems view: Early formulation and current status. In S. Oyama, P.E. Griffiths, & R.D. Gray

(Eds.), *Cycles of contingency: Developmental systems and evolution* (pp. 41–54). Cambridge: MIT Press.

Gottlieb, G., & Vandenbergh, J.G. (1968). Ontogeny of vocalization in duck and chick embryos. *Journal of Experimental Zoology, 168,* 307–325.

Gottlieb, M.S. (2007). The developmental point of view: Anything can change anything; Permission to doubt dogma, the Gilbert Gottlieb legacy. *European Journal of Developmental Science, 1,* 200–207.

Gregory, R.L. (1997). Knowledge in perception and illusion. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences, 352*, 1121–1127.

Grene, M., & Depew, D. (2004). *The philosophy of biology: An episodic history*. Cambridge: Cambridge University Press.

Griffiths, P.E., & Tabery, J. (2013). Developmental systems theory: What does it explain, and how does it explain it? *Advances in Child Development and Behavior, 44,* 65–94.

Grohmann, J. (1939). Modifikation oder funktionsreifung. *Zeitschrift für Tierpsychologie, 2,* 132–144.

Harlow, H.F. (1958). The nature of love. *American Psychologist, 13,* 673–685.

Hatzimoysis, A. (2009). Emotions in Heidegger and Sartre. In P. Goldie (Ed.), *The Oxford handbook of philosophy of emotion* (pp. 215–235). New York: Oxford University Press.

Heft, H. (1989). Affordances and the body: An intentional analysis of Gibson's ecological approach to visual perception. *Journal for the Theory of Social Behaviour, 19,* 1–30.

Heft, H. (2001). *Ecological psychology in context: James Gibson, Roger Barker, and the legacy of William James's radical empiricism*. Mahwah: Lawrence Erlbaum Associates.

Heft, H. (2007). The social constitution of perceiver-environment reciprocity. *Ecological Psychology, 19,* 85–105.

Heft, H. (2010). Affordances and the perception of landscape: An inquiry into environmental perception and aesthetics. In C. Ward Thompson, P. Aspinall, & S. Bell (Eds.), *Innovative approaches to researching landscape and health: Open space: People space 2* (pp. 9–32). New York: Routledge.

Heft, H. (2012). Foundations of an ecological approach to psychology. In S.D. Clayton (Ed.). *The Oxford handbook of environmental and conservation psychology* (pp. 11–40). Oxford: Oxford University Press.

Heft, H. (2018). Places: Widening the scope of an ecological approach to perception–action with an emphasis on child development. *Ecological Psychology, 30,* 99–123.

Heft, H. (2020). Ecological psychology and enaction theory: Divergent groundings. *Frontiers in Psychology, 11*, 991.

Heidegger, M. (1927/1962). *Being and time*. New York: Harper and Row.

Heras-Escribano, M. (2019). *The philosophy of affordances*. Cham: Palgrave Macmillan.

Hertzberger, H. (1991). *Lessons for students in architecture*. Rotterdam: 010 Publishers.

Hobbes, T. (1651/2014). *Leviathan*. Cambridge: Cambridge University Press.

Hodges, B.H., & Baron, R.M. (1992). Values as constraints on affordances: Perceiving and acting properly. *Journal for the Theory of Social Behaviour, 22,* 263–294.

Hodges, B.H., & Fowler, C.A. (2015). Cooperativity and selectivity in conversation. *Ecological Psychology, 27,* 279–289.

Holt, E.B. (1914/1973). *The concept of consciousness*. New York: Arno Press.

Holt, E.B. (1915). *The Freudian wish and its place in ethics*. New York: Henry Holt.

Hutto, D.D., & Myin, E. (2013). *Radicalizing enactivism: Basic minds without content*. Cambridge: MIT Press.

Ingold, T. (2000). *The perception of the environment: Essays in livelihood, dwelling and skill*. New York: Routledge.

Ingold, T. (2007). *Lines: A brief history*. New York: Routledge.

Ingold, T. (2011). *Being alive: Essays on movement, knowledge and description*. New York: Routledge.

Jacobs, D.M., & Michaels, C.F. (2007). Direct learning. *Ecological Psychology, 19,* 321–349.

James, W. (1884). What is an emotion? *Mind, 9,* 188–205.

James, W. (1890/1950). *The principles of psychology: Volume II*. New York: Dover Publications.

Jennings, H.S. (1906). *The behavior of the lower organisms*. New York: Columbia University Press.

Jenson, J.C. (1995/1996). *Reclaiming your life: A step-by-step guide to using regression therapy to overcome the effects of childhood abuse*. New York: Meridian.

Jeschke, A.M., De Lange, A.M.M., Withagen, R., & Caljouw, S.R. (2020). Crossing the gap: Older adults do not create less challenging stepping stone configurations than young adults. *Frontiers in Psychology, 11,* 1657.

Jeuk, A.A. (2019). Concern and the structure of action. *HUMANA. MENTE Journal of Philosophical Studies, 12*, 249–270.

Johnston, T.D. (1987). The persistence of dichotomies in the study of behavioral development. *Developmental Review, 7,* 149–182.

Johnston, T.D. (1997). Comment on Cooper. In C. Dent-Read & P. Zokow-Goldring (Eds.), *Evolving explanations of development* (pp. 87–89). Washington: American Psychological Association.

Johnston, T.D. (2001). Toward a systems view of development: An appraisal of Lehrman's critique of Lorenz. In S. Oyama, P.E. Griffiths, & R.D. Gray (Eds.), *Cycles of contingency: Developmental systems and evolution* (pp. 15–23). Cambridge: MIT Press.

Jones, E. (1953–1957/1977). *The life and work of Sigmund Freud*. New York: Penguin Books.

Jongeneel, D, Withagen, R., & Zaal, F.T.J.M. (2015). Do children create standardized playgrounds? A study on the gap-crossing affordances of jumping stones. *Journal of Environmental Psychology, 44,* 45–52.

Kadar, E., & Effken, J. (1994). Heideggerian meditations on an alternative ontology for ecological psychology: A response to Turvey's (1992) proposal. *Ecological Psychology, 6,* 297–341.

Kant, I. (1790/2000). *Critique of the power of judgment*. Cambridge: Cambridge University Press.

Käufer, S., & Chemero, A. (2015). *Phenomenology: An introduction*. Cambridge: Polity Press.

Koffka, K. (1935/1999). *Principles of Gestalt psychology*. New York: Routledge.

Koyré, A. (1965). *Newtonian studies*. London: Chapman & Hall.

Krueger, J. (2014). Dewey's rejection of the emotion/expression distinction. In T. Solymosi & J. Shook (Eds.), *Neuroscience, neurophilosophy and pragmatism: Understanding brains at work in the world* (pp. 140–161). New York: Palgrave Macmillan.

Krueger, J., & Colombetti, G. (2018). Affective affordances and psychopathology. *Discipline Filosofiche*, *18,* 221–247.

Kuo, Z.-Y. (1921). Giving up instincts in psychology. *Journal of Philosophy, 18,* 645–664.

Lambie, J.A. (2020). The demanding world of emotions: A Gestalt approach to emotion experience. *New Ideas in Psychology, 56,* 100751.

Lambie, J.A., & Marcel, A. (2002). Consciousness and the varieties of emotion experience: A theoretical framework. *Psychological Review, 109,* 219–259.

Lazarus, R.S. (1966). *Psychological stress and the coping process*. New York: McGraw-Hill.

Lazarus, R.S. (1991). *Emotion and adaptation*. New York: Oxford University Press.

Lee, D.N. (1976). A theory of visual control of braking based on information about time-to-collision. *Perception, 5,* 437–459.

Lefaivre, L., & Tzonis, A. (1999). *Aldo van Eyck: Humanist rebel*. Rotterdam: 010 Publishers.

Lehrman, D.S. (1953). A critique of Konrad Lorenz's theory of instinctive behavior. *The Quarterly Review of Biology, 28,* 337–363.

Lewin, K. (1926/1999). Intention, will, and need. In M. Gold (Ed.). *The complete social scientist: A Kurt Lewin reader* (pp. 83–115). Washington: American Psychological Association.

Lewin, K. (1938). *The conceptual representation and the measurement of psychological forces*. Durham: Duke University Press.

Lewontin, R.C. (2000). Foreword. In S. Oyama. *The ontogeny of information: Developmental systems and evolution*. Durham: Duke University Press.

Lombardo, T.J. (1987/2017). *The reciprocity of perceiver and environment: The evolution of James J. Gibson's ecological psychology*. New York: Routledge.

Masson, J.M. (1984). *The assault on truth: Freud's suppression of the seduction theory*. New York: Farrar, Straus, and Giroux.

Maturana, H.R., & Varela, F.J. (1987). *The tree of knowledge: The biological roots of human understanding*. Boston: New Science Library.

Mayr, E. (1992). The idea of teleology. *Journal of the History of Ideas, 53,* 117–135.

Meijsing, M. (1998). Where is meaning in this world? Perception in an evolutionary context. In T. Derksen (Ed.), *The promise of evolutionary epistemology* (pp. 81–99). Tilburg: Tilburg University Press.

Merleau-Ponty, M. (1945/2014). *Phenomenology of perception*. London: Routledge.

Merleau-Ponty, M. (1948/1964). *Sense and nonsense*. Evanston: Northwestern University Press.

Michaels, C.F., & Carello, C. (1981). *Direct perception*. Englewood Cliffs: Prentice Hall.

Michaels, C.F., & De Vries, M.M. (1998). Higher order and lower order variables in the visual perception of relative pulling force. *Journal of Experimental Psychology: Human Perception and Performance, 24,* 526–546.

Miller, A. (1979/2007). *The drama of the gifted child: The search for the true self*. New York: Basic Books.

Miller, A. (1980/2002). *For your own good: Hidden cruelty in child-rearing and the roots of violence*. New York: Farrar, Straus and Giroux.

Miller, A. (1981/1998). *Thou shalt not be aware: Society's betrayal of the child*. New York: Farrar, Straus and Giroux.

Miller, A. (1988/1991a). *The untouched key: Tracing childhood trauma in creativity and destructiveness*. New York: Anchor Books.

Miller, A. (1988/1991b). *Banished knowledge: Facing childhood injuries*. New York: Anchor Books.

Morss, J.R. (1985). Old Mead in new bottles: The impersonal and the interpersonal in infant knowledge. *New Ideas in Psychology, 3,* 165–176.

Müller, J. (1837–1840/1938). *The elements of physiology*. London: John Murray.

Neisser, U. (1967). *Cognitive psychology*. New York: Appleton, Century & Crofts.

Nelson, C.A., Fox, N.A., & Zeanah, C.H. (2014). *Romania's abandoned children: Deprivation, brain development, and the struggle for recovery*. Cambridge: Harvard University Press.

Nietzsche, F. (1883–1887/2003). *Thus spoke Zarathustra: A book for everyone and no one*. London: Penguin.

Noble, W.G. (1981). Gibsonian theory and the pragmatist perspective. *Journal for the Theory of Social Behaviour, 11,* 65–85.

Odling-Smee, F.J., Laland, K.N., & Feldman, M.W. (2003). *Niche construction: The neglected process in evolution*. Princeton: Princeton University Press.

Oyama, S. (1985/2000). *The ontogeny of information: Developmental systems and evolution*. Durham: Duke University Press.

Oyama, S. (2001). Terms in tension: What do you do when all the good terms are taken? In S. Oyama, P.E. Griffiths, & R.D. Gray (Eds.), *Cycles of contingency: Developmental systems and evolution* (pp. 177–193). Cambridge: MIT Press.

Oyama, S. (2011). Life in mind: Commentary on Evan Thompson's 'Mind in life'. *Journal of Consciousness Studies, 18,* 83–93.

Oyama, S., Griffiths, P.E., & Gray, R.D. (2001). Introduction: What is developmental systems theory. In S. Oyama, P.E. Griffiths, & R.D. Gray (Eds.), *Cycles of contingency: Developmental systems and evolution* (pp. 1–11). Cambridge: MIT Press.

Prinz, J. (2004). *Gut reactions: A perceptual theory of emotion*. New York: Oxford University Press.

Raczaszek-Leonardi, J., Nomikou, I., Rohlfing, K.J., & Deacon, T.W. (2018). Language development from an ecological perspective: Ecologically valid ways to abstract symbols. *Ecological Psychology, 30,* 39–73.

Radar, N., & Zukow-Goldring, P., (2012). Caregivers' gestures direct infant attention during early word learning: The importance of dynamic synchrony. *Language Sciences, 34,* 559–568.

Ratcliffe, M. (2015). *Experiences of depression: A study in phenomenology*. Oxford: Oxford University Press.

Reed, E.S. (1982a). Descartes' corporeal ideas hypothesis and the origin of scientific psychology. *Review of Metaphysics, 35,* 731–752.

Reed, E.S. (1982b). Darwin's worms: A case study in evolutionary psychology. *Behaviorism, 10,* 165–185.

Reed, E.S. (1985). An ecological approach to the evolution of behavior. In T. Johnston & A. Pietrewicz (Eds.), *Issues in the ecological study of learning* (pp. 357–383). Hillsdale: Erlbaum.

Reed, E.S. (1988). *James J. Gibson and the psychology of perception*. New Haven: Yale University Press.

Reed, E.S. (1996a). *Encountering the world: Toward an ecological psychology*. New York: Oxford University Press.

Reed, E.S. (1996b). *The necessity of experience*. New Haven: Yale University Press.

Richards, R.J. (2002). *The romantic conception of life: Science and philosophy in the age of Goethe*. Chicago: The University of Chicago Press.

Rietveld, E. (2008). Situated normativity: The normative aspect of embodied cognition in unreflective action. *Mind, 117,* 973–1001.

Rietveld, E. (2016). Situating the embodied mind in a landscape of standing affordances for living without chairs: Materializing a philosophical worldview. *Sports Medicine, 46*, 927–932.

Rietveld, E., & Brouwers, A.A. (2017). Optimal grip on affordances in architectural design practices: An ethnography. *Phenomenology and the Cognitive Sciences, 16,* 545–564.

Rietveld, E., & Kiverstein, J. (2014). A rich landscape of affordances. *Ecological Psychology, 26*, 325–252.

Rietveld, R., & Rietveld, E. (2011). Designing spontaneous interactions. *OASE-Architecture Journal, 85,* 33–41.

Rossi, P. (1962/1970). *Philosophy, technology, and the arts in the early modern era*. New York: Harper & Row.

Russell, B. (1946/1995). *History of western philosophy*. New York: Routledge.

Schachter, S., & Singer, J.E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69,* 379–399.

Shaw, R.E., Turvey, M.T., & Mace, W.M. (1982). Ecological psychology: The consequence of a commitment to realism. In W.B. Weimer & D.S. Palermo (Eds.), *Cognition and the symbolic processes: Volume 2* (pp. 159–226). Hillsdale: Erlbaum.

Shotter, J. (1983). Duality of structure and intentionality in an ecological psychology. *Journal for the Theory of Social Behaviour, 13,* 19–43.

Slaby, J. (2017). More than a feeling: Affect as radical situatedness. *Midwest Studies in Philosophy, 41,* 7–26.

Sporrel, K., Caljouw, S.R., & Withagen, R. (2017). Children prefer a nonstandardized to a standardized jumping stone configuration: Playing time and judgments. *Journal of Environmental Psychology, 53,* 131–137.

Stockard, C.R. (1909). The development of artificially produced cyclopean fish: 'The magnesium embryo'. *The Journal of Experimental Zoölogy, 6,* 285–337.

Stolorow, R.D. (2007). *Trauma and human existence: Autobiographical, psychoanalytic and philosophical reflections*. New York: The Analytic Press.

Szokolszky, A., & Read, C. (2018). Developmental ecological psychology and a coalition of ecological–relational developmental approaches. *Ecological Psychology, 30*, 6–38.

Thompson, E. (2007). *Mind in life: Biology, phenomenology, and the sciences of mind*. Cambridge: Harvard University Press.

Tinbergen, N. (1951/1955). *The study of instinct*. London: Oxford University Press.

Turvey, M.T. (1990). Coordination. *American Psychologist, 45,* 938–953.

Turvey, M.T. (1992). Affordances and prospective control: An outline of an ontology. *Ecological Psychology, 4,* 173–187.

Turvey, M.T. (2009). On the notion and implications of organism-environment system. *Ecological Psychology, 21,* 97–111.

Turvey, M.T. (2019). *Lectures on perception: An ecological perspective*. New York: Routledge.

Turvey, M.T., & Carello, C. (1995). Dynamic touch. In W. Epstein & S. Rogers (Eds.), *Handbook of perception and cognition: Perception of space and motion* (pp. 401–490). New York: Academic Press.

Turvey, M.T., & Shaw, R.E. (1978). The primacy of perceiving: An ecological reformulation of perception as a point of departure for understanding memory. In L.-G. Nilsson (Ed.), *Perspectives on memory research: Essays in honor of Uppsala University's 500th anniversary* (pp. 167–222). Hillsdale: Erlbaum.

Van Den Herik, J.C. (2019). *Talking about talking: An ecological-enactive perspective on language*. Ede: Print Service.

Van Der Schaaf, A.L., Caljouw, S.R., & Withagen, R. (2020). Are children attracted to play elements with an open function? *Ecological Psychology, 32,* 79–94.

Van Der Schaaf, A.L., Jeschke, A.M., Caljouw, S.R., & Withagen, R. (2021). The degree to which traditional play equipment, Parkour play elements, and Aldo van Eyck's play sculptures have an open function. *European Early Childhood Education Research Journal, 29*, 393–302.

Van Dijk, L. (2016a). Laying down a path in talking. *Philosophical Psychology, 29,* 993–1003.

Van Dijk, L. (2016b). *A horizontal attitude: Gibsonian psychology and an ontology of doing*. Antwerp: University of Antwerp Press.

Van Dijk, L. (2021a). Psychology in an indeterminate world. *Perspectives on Psychological Science, 16,* 577–589.

Van Dijk, L. (2021b). Affordances in a multispecies entanglement. *Ecological Psychology, 33*, 73–89.

Van Dijk, L., & Kiverstein, J. (2021). Direct perception in context: Radical empiricist reflections on the medium. *Synthese, 199*, 8389–8411.

Van Dijk, L., & Rietveld, E. (2017). Foregrounding sociomaterial practice in our understanding of affordances: The skilled intentionality framework. *Frontiers in Psychology*, 7, 1969.

Van Dijk, L., & Rietveld, E. (2021). Situated anticipation. *Synthese, 198,* 349–371.

Van Dijk, L., & Withagen, R. (2014). The horizontal worldview: A Wittgensteinian attitude towards scientific psychology. *Theory & Psychology, 24,* 3–18.

Van Dijken, S., Van Der Veer, R., Van IJzendoorn, M., & Kuipers, H.J. (1998). Bowlby before Bowlby: The sources of an intellectual departure in psychoanalysis and psychology. *Journal of the History of the Behavioral Sciences, 34,* 247–269.

Varela, F.J., Thompson, E., & Rosch, E. (1991/2016). *The embodied mind: Cognitive science and human experience*. Cambridge: MIT Press.

Wagman, J.B., Caputo, S.E., & Stoffregen, T.A. (2016). Sensitivity to hierarchical relations among affordances in the assembly of asymmetrical tools. *Experimental Brain Research, 234,* 2923–2933.

Wagman, J.B., & Miller, D.B. (2003). Nested reciprocities: The organism-environment system in perception-action and development. *Developmental Psychobiology, 42,* 317–334.

Walls, G.L. (1942). *The vertebrate eye and its adaptive radiation*. Bloomfield Hill: Cranbrook Institute of Science.

Warren, W.H. (1984). Perceiving affordances: Visual guidance of stair climbing. *Journal of Experimental Psychology: Human Perception and Performance, 10,* 683–703.

Wells, W.R. (1922). The meaning of "inherited" and "acquired" in reference to instinct. *The Journal of Abnormal Psychology and Social Psychology, 17*, 153–161.

Whitehead, A.N. (1925/1967). *Science and the modern world*. New York: The Free Press.

Wilson, E.O. (1998). *Consilience*. New York: Knopf.

Withagen, R. (2004). The pickup of nonspecifying variables does not entail indirect perception. *Ecological Psychology, 16,* 237–253.

Withagen, R. (2018). Towards an ecological approach to emotions and the individual differences therein. *New Ideas in Psychology, 51,* 21–26.

Withagen, R. (in preparation). *An ecological approach to remembering*.

Withagen, R., & Caljouw, S.R. (2017). Aldo van Eyck's playgrounds: Aesthetics, affordances, and creativity. *Frontiers in Psychology, 8*, 1130.

Withagen, R., & Chemero, A. (2009). Naturalizing perception: Developing the Gibsonian approach to perception along evolutionary lines. *Theory & Psychology, 19,* 363–389.

Withagen, R., & Costall, A. (in press). What does the concept of affordances afford? *Adaptive Behavior.*

Withagen, R., De Poel, H.J., Araújo, D., & Pepping, G.J. (2012). Affordances can invite behavior: Reconsidering the relation between affordances and agency. *New Ideas in Psychology, 30,* 250–258.

Withagen, R., & Van Der Kamp, J. (2010). Towards a new ecological conception of perceptual information: Lessons from a developmental systems perspective. *Human Movement Science, 29,* 149–163.

Withagen, R., & Van Wermeskerken, M. (2010). The role of affordances in the evolutionary process reconsidered: A niche construction perspective. *Theory & Psychology, 20,* 489–510.

Wittgenstein, L. (1953). *Philosophical investigations*. Oxford: Blackwell.

Zimmer, C. (2004). *Soul made flesh: The discovery of the brain and how it changed the world.* New York: The Free Press.

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