Change, the Final Frontier
Introducing a Process Approach to Psychology

Turn, turn, my wheel! All things must change
To something new, to something strange;
Nothing that is can pause or stay;
The moon will wax, the moon will wane,
The mist and cloud will turn to rain,
The rain to mist and cloud again,
To-morrow be to-day.
From *Kéramos*, a poem by Henry Wadsworth Longfellow

1.1 What Are Processes?

What exactly are processes? Researchers often use this term in psychological studies: psychological processes, developmental processes, social processes, schooling processes, clinical processes, and so forth. Johanna Seibt, an eminent process philosopher, provides a non-technical definition: 'What holds for all dynamic entities labelled "processes", however, is that they occur – that they are somehow or other intimately connected to time, and often, though not necessarily, related to the directionality or the passage of time' (Seibt, 2020, p. 1; for a technical definition see Seibt, 2004; for a comparison with the substance view, see Winters, 2017).

In this section, we will unpack the definition of processes provided by Seibt (2020), outlining six specific characteristics of processes. These characteristics further draw upon the scholarship from several process theorists, including Nicholas Rescher, Mark Bickhard, and Johanna Seibt, as well as John Dupré and Daniel Nicholson's (2018) book entitled *Everything Flows: Towards a Processual Philosophy for Biology*. Note that the meaning of process is later unpacked via its juxtaposition with the notion of *substance*, where we draw on the foundational work of Willis Overton.

First, and most broadly, a process is any temporal sequence or flow of events. This sequence of events can only be called a process, however, if there is *process causality* or *process conditionality* between the events. That is,

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processes are 'integrated series of connected developments unfolding in pro-grammatic coordination: an orchestrated series of occurrences that are sys-tematically linked to one another either causally or functionally' (Rescher, 2000, p. 23). This means that any event in the sequence is conditioned or constrained by the preceding events. In other words, the process must be characterized by *iterativity*: an event at *t+1* is dependent on the event at *t* (Van Geert & Steenbeek, 2005a). Second, any truly iterative process will occur within concrete, particular subjects (i.e., a thing or person to which the process applies). An example of such a subject is a concrete individual person, a dyad, family, group, or culture. This requirement is relevant for living systems, and as such, we should be careful to avoid the misunder-standing that all processes require a particular subject. There are many examples of subject-less processes: rain, wind, electricity, light, osmosis, fermentation, adaptive radiation (Dupré & Nicholson, 2018, p. 12; Seibt, 2018). Subject-less processes pertain to the interaction of many components that, for the duration of the process, constitute an interactive whole that may resemble a subject (water molecules, gaseous molecules moving with a particular direction and speed in the case of rain, for instance).

Third, processes (as occurring within a subject) function separately *and* simultaneously in relation to their material, social, and cultural context. Processes are thus embedded in their (layered) context, such that the itera-tivity of a process is intertwined with that of the context.

Fourth, iterative sequences of events or occurrences involve change that is underpinned by activity (Raeff, 2016). Activity forms the basis of change for a stone that changes its position as it rolls downhill. Activity supports the changes in your perception as your eyes move along this sentence. Processes are therefore *action-based*. The action-based nature of processes has two important implications for how we approach them: one, actions necessarily move in a certain direction. This direction comes from capaci-ties, potentials, and (for living systems) intentionality (Campbell, 2010; Gill, 2003). Two, actions do not have sharp boundaries, such that it is unclear where one action stops and the next begins (Raeff, 2016): 'They are individuated not so much by where they are as by what they do' (Dupré & Nicholson, 2018, p. 13). The iterative steps that make up a process are therefore characterized by a certain fuzziness or indeterminacy.

Fifth, processes have temporal properties or structure (Dupré & Nicholson, 2018; Seibt, 2004). These properties and forms of structure emerge over the course of the process, and they structure the action of the process in some way. This structuring may relate to how affordances (i.e., possibilities for action) are created by interactional events, to coherent patterns and their recurrence

across the process, and to mechanisms of change that occur across the process. For pragmatic and descriptive reasons, these properties or structures allow us to observe them as 'things' (or 'subjects', as mentioned), as they allow for a level of stability on a larger timescale (Dupré & Nicholson, 2018).

Sixth, a process involves multiple timescales (Dupré & Nicholson, 2018). On the smallest timescale, we can observe fluctuations in the content of events as situated in concrete contextual changes. For many (but not all) processes that we are likely to study in psychology, the micro-level timescale occurs across seconds, minutes, or hours. However, the units of time that characterize the micro-level timescale (and any timescale for that matter) depend on the phenomenon in question. Some phenomena, such as an individual's identity narrative, will likely not demonstrate variability from minute to minute, but will require weeks, months, or years to show fluctuations (De Ruiter & Gmelin, 2021). As we move up in timescales, from meso- to macro-level timescales (obviously across increasing units of time), the variability that we might observe in smaller timescales becomes patterned. We may observe self-sustained stability or developmental change, for example. Each timescale corresponds with a specific scale of the organization, from the level of quantum physical processes to the level of organisms and societies. This characteristic is crucial, as it signifies that 'the world is process (relations) all the way up and all the way down' (Bickhard, 2011a, p. 13).

Seventh, processes that occur on different timescales – while separate – are intrinsically interconnected. Micro-level processes of variability emerge into the patterns and their development that occur on the meso- and then macro-levels, and the patterns that emerge at these higher levels constrain the variability of micro-level activity.

1.2 Introducing the Juxtaposition: A Substance Approach versus a Process Approach

In order to fully grasp what the study of processes entails, it is useful to contrast it with what it does *not* entail. This is because the process approach deviates from the approach adopted in mainstream psychological science. As such, the process approach can be positioned outside what is deemed conventional. To understand what is non-conventional, it is necessary to first grasp what is conventional. This introduction to the substantialist and processualist perspectives will be recursively revisited in later chapters, each chapter describing how these perspectives are manifested in – or are relevant to – the specific area or aspect of psychological research in question.

1.2.1   Mainstream Substantialism

The current dominant approach in psychology entails the study of psychological constructs as stable and enduring 'substances'. This concept has a long and complicated philosophical history, which the interested reader can read more about later on in this chapter. What we wish to focus on here is that the concept of substance pervades so much of our thinking and reasoning in present-day psychological science, and science more broadly. Bracketing the philosophical history of the concept for a moment, the basic meaning of the concept can be easily retrieved from its etymology, that is to say, from the meaning of its original components. The word is derived from the Latin verb *substare*, which is composed of *sub* (under) and *stare* (stand). Substance then means the stable, permanent, and enduring essence (the latter word derives from 'being') that underlies, or literally under-stands, the fleeting, non-enduring, ephemeral, and impermanent appearances that are the content of our observations: 'Substances are that which can exist on their own, where accidents require a support from substances in order to exist' (Smith, 1997, p. 108; where 'accidents' are events, see also Hoffman & Rosenkrantz, 1997). From a substance approach then, to understand something means to grasp its underlying permanent, independent, and universal essence.

To illustrate this substance approach in action, think about how psychologists tend to explain behaviour. For instance, a researcher can understand a particular child's restless, agitated, and nervous behaviours by referring to their under-lying (or under-standing) attention deficit hyperactivity disorder (ADHD). ADHD is commonly assumed to be a stable and enduring psychological condition that explains the child's observed behaviour. Similarly, a researcher can understand a person's solving of a series of questions and problems by referring to that person's intelligence, which – like the case of ADHD – is viewed as the stable and static factor underlying and explaining the person's (variable) performance. In many ways, a substance approach reflects the norms that we adopt in society at large. For example, adopting a substantialist perspective of the world is obvious. Doing so is consistent with the grammatical habits of many Indo-European languages, with their distinction between nouns and verbs. We usually refer to ourselves and the things that are important to us in terms of nouns, referring to a-temporal objects. We may refer to these nouns as undergoing changes, in the form of verbs (e.g., the student's ADHD is improving), but we are quick to refer to nouns as the underlying thing of interest (Raeff, 2019). In addition, according to Michael Billig (2013), scientific communication practices tend to over-emphasize the use of nouns, replacing process

descriptions with nouns. By doing so, they amplify the habit of substance reasoning in the sciences (see also Chapter 6).

Substance reasoning is also comforting, and the most obvious habit of explanation. When we look at the world around us, we don't necessarily see processes. Any phenomena will be stable at a small enough timescale. Arguably, one of the smallest timescales is that of the current moment, where we will, of course, perceive stability. Our experience of ourselves and our world may resemble stable things, such as an emotion, a loving relationship, a conceptualization of ourselves, a doubt, a skill, or the oak tree in our garden. However, if we zoom out a little in time (or a lot, depending on the object), we will see that any of these 'things' are not actually stable (and thus not 'things'). Instead, they are all in a state of flux. The emotion evolved from pride to guilt (from one *hour* to the next), the relationship is moving toward a new level of commitment (from one *day* to the next), the self-conceptualization is evolving from novice to expert (from one *month* to the next), and that tree is growing larger (from one *year* to the next). We simply need to look at a large enough timescale in order to see ourselves and our world as continuously changing (De Ruiter & Gmelin, 2021).

The stability that we perceive in any given moment is real of course, and it can be useful and comforting to take stock of the current state of things. However, the perception of stability should not be used to inform our understanding of the ontology – the nature – of the thing we are perceiving (Seibt, 2020). As Rescher (1996) described, doing so would be 'at best a useful fiction and at worst a misleading delusion' (p. 28). This brings us to the processualist perspective that we wish to support.

In developmental psychology, the distinction between substance versus process ontology is most explicitly made by Willis Overton (2015), who refers to it as the Cartesian-split-mechanistic ontology (contrasting a process-relational ontology). The distinction can best be explained in terms of Overton's own summarizing scheme:

> Atomism versus Holism; Fixity versus Activity of nature; Stasis and Being versus Change and Becoming; Nature as substance versus nature as process; Uniformity versus the Necessary organization of nature; Dualism versus a Pluralistic Universe; Realism versus Constructivism; Either/or Split understanding versus Relational understanding; Dualistic split between objectivism and subjectivism versus Multiple perspectives; Efficient/material causal explanation versus Multiple forms of explanation. (Overton, 2015, p. 12)

The substance-oriented or Cartesian-split/mechanistic ontology (in the former of each of the above distinctions) is typical for mainstream

psychology (Witherington et al., 2018). This is not to say that a hardliner substantialist approach is the only explanatory perspective that psychology actually adopts. Some notable exceptions are the many researchers that are devoted to a person-oriented approach (Bergman & Wångby, 2014), for example, those who develop differential equation techniques (e.g., Boker & Laurenceau, 2006; Felmlee & Greenberg, 1999; Gottman, 2003; Steele & Ferrer, 2011). Differential equations present a basic mathematical representation of change, and the rate of change of some variable. In addition, but from a completely different methodological perspective, psychologists who adopt a discursive approach to psychological phenomena also distance themselves from a substance approach (Te Molder, 2015). In approaching psychological phenomena as socially constructed and situated processes, these qualitative scholars also adopt a process approach. Finally, those who adopt a complex dynamic systems approach demonstrate a commitment to process ontology (as a 'group', they are widely divergent, for example, Howe & Lewis, 2005; Lewis & Granic, 1999; Overton, 2013a, 2013b; Thelen & Smith, 1994; Van Geert, 1994; Witherington, 2011).

1.2.2   Emerging Processualism: Process Metaphysics

Contrasting the substantialist approach is a processualist approach. An approach that (summarizing from Overton's (2015) scheme) stresses holism, activity, change, becoming, process, organization, pluralism, constructivism, and relationalism. This approach stems from process philosophy (or *metaphysics*, more precisely – which is the branch of philosophy that examines the fundamental nature of reality).

Rescher (1996) described two premises of a process philosophy, which may also function as a philosophical summary of the properties of processes described in Section 1.1. One is that a process is something for which change is essential, meaning that the process ceases to exist if it can no longer change. There is a dynamic and active self-maintenance involved in this property, which is why Dupré and Nicholson (2018, p. 13) prefer the term 'dynamicity' above 'change'. This is apparent in many everyday examples of processes: a river is no longer a river if it does not flow, a dance is no longer a dance if the dancers do not move, and we as humans are no longer *living* human beings if we do not act, think, engage, breath, feel, or move. In fact, we are at all moments human *becomings* rather than human *beings* (Prigogine, 1980).

The second premise of a process philosophy, noted by Rescher (1996), is that stability is *derived* from dynamics and change. This means that stability emerges out of processes that occur on smaller timescales. Stability,

from a process perspective, is thus secondary to dynamics and change. This premise is an ontological one: phenomena cannot be reduced to some stable essence or substance. This ontological premise is pivotal in the process notion that a phenomenon is process all the way down, as Bickhard (2009a) and as others have stressed (Dupré & Nicholson, 2018; see also Section 1.1).

Classical process philosophy is represented by Alfred North Whitehead's *Process and Reality* (1929; see also Rescher, 2000; note that a historical overview is provided in Section 1.4). Whitehead's work has had relatively little direct influence on scientific research, however, probably due to its rather opaque character. Modern process theorists thus often turn to different scientific foundations for process thought. Bickhard, for instance, consistently refers to fundamental theories of physics, quantum physics in particular. Others, such as Dupré and Nicholson or Overton, base their processual ontologies primarily on organismic biology. When applying these broad perspectives, these physical and biological foundations often converge on complex dynamic systems theory. This is a meta-theory that is lower in abstraction than the highly abstract perspectives of organicism and relationism (Overton, 2013a, 2013b). This meta-theory, which the mentioned scholars also endorse, serves as the foundation of this book (see Chapter 2).

The premises of a process philosophy encase a crucial epistemological argument: a process philosophy argues that making processes the primary focus of our endeavours as researchers and scholars is the most appropriate and effective way of understanding our world. Bickhard (2003, p. 294) formulates this quite explicitly, stating that 'one of the major themes of the history of science is the replacement of substance assumptions about the phenomena of interest with process models'. He notes, however, that the 'most significant exceptions to this historical pattern are found in studies of the mind. Here, substance assumptions are still ubiquitous, ranging from models of representation to those of emotions to personality and psychopathology. Substance assumptions do pernicious damage to our ability to understand such phenomena'.

While psychology of course accepts and aims to understand how humans change, in mainstream psychology change is treated as secondary to stability, and to phenomena as substances. All too often, change is treated like a mist that looms in front of an observer, something that conceals the true properties – the substance – that they are actually trying to observe. The observer needs to get through that mist, carefully avoiding the auxiliary obstacles, in order to arrive at the real objects that the mist conceals. In this view, change is seen as something that gets in the way of studying something's essence,

represented by measurement error or noise. As the observer passes through it, they will reach the final frontier – the substance or essence.

We hope to convince you that *change* should be the final frontier. The importance of adopting a process approach in psychology, and understanding the resistance to doing this, forms the core aim of this book. To do this, we will unpack the various ontological and epistemological assumptions and practices that mark the substance approach so dominant in mainstream psychology, as well as those that characterize the kind of process approach we envision for psychology.

1.3   Our Positions: Critical Realism and Plurality

1.3.1   *Critical Realism*

When discussing questions of ontology, questions of realism automatically become relevant. While a substance approach aligns quite easily with realism, the relationship between a process approach and realism is more complex. For a substantialist psychologist, the nature of psychological domains can be reduced to fixed, underlying things – whether they are factors, traits, genes, or any other 'essence'. Such a perspective thus stresses the *intransitivity* (Pilgrim, 2019) of psychological domains and assumes that these domains are not influenced by us as researchers, as outsiders to these 'things'. Under this assumption, a substantialist would adopt a positivist approach to this reality, whereby scientists 'discover' the predictable characteristics and laws of a fixed reality that awaits said discovery; a *naive-realist* stance.

If a substance approach contrasts a process approach, does this make a processualist anti-realist? No. Or at least, not from the processual approach that we adopt (recall that a process approach can be applied in an array of different ways). We will describe here the line between realism and anti-realism that we attempt to walk in this book – *critical realism* (the following description of our critical-realism stance draws heavily from Pilgrim (2019). This is a meta-theoretical stance that informs much of our analyses in this book.

Let us make it clear that we do not wish to reject realism (adopting a strict anti-realist approach), nor do we wish to adopt a naive-realism stance that adheres to positivism (i.e., where reality is considered to be fixed and independent of changing contexts, such that our interaction with it is primarily a matter of *discovering* or *confirming* it; Pilgrim (2019)).

However, with this it is important to stress that the things that make up reality are not static. Instead, they are transient. This means that reality

(or at least some domains of reality, such as the psychological) is change-able, and that this change comes about because we are part of reality, inter-acting with it. We are not simply passive observers or consumers of our reality, but active agents in the creation of the reality in which we live and with which we interact (see Chapter 12 for an in-depth depiction). Therefore, we reject the 'intransitivity perspective' of reality. Instead, a critical-realist stance places emphasis on the fact that we influence real-ity as we interact with it. Note that this does not necessarily imply that we literally *construct* reality, making reality relative (as is the case from a strong subjectivism perspective). Instead, the critical-realism perspective acknowledges and explores the influence that we have on the development of reality and its characteristics, processes, features.

If we influence reality as we move through it, the critical-realist stance works from the premise of *epistemological relativism*. This is the notion that – because any understanding of reality is situated in time and space – there are necessarily different ways of *construing* reality. All knowledge bears the signs and properties of its constructive activity. As such, we believe that – while reality itself is not necessarily relative to the knower – the knowledge that one obtains *about* reality *is* (see Chapter 6 on how language creates perceived realities). With this, we stress the importance of *epistemic humility* for psychological science. In acknowledging that we construct the knowledge that we are pursuing, our knowledge is fallible. It is influenced by the biases and limitations of our scholarly actions and practices, which we must try to make explicit.

This last characteristic of our critical-realist stance brings us to an important implication: room for pluralism. As critical realists, we are 'con-cerned with mapping the ontological character of social reality' (Archer, Decoteau & Gorski, 2016, p. 3). Since the character of social reality is multi-faceted and multi-layered, we acknowledge that a complete under-standing of social reality requires a culmination of different (levels of) explanations (Potochnik & De Sanches, 2020).

The ontology of some aspects of social reality is that of individual psy-chological processes, while others are population distributions. These dif-ferent levels of ontologies require different approaches to adequately 'map' the entirety of social reality. In psychology, critical realists emphasize the importance of studying processes, including complexity and emergence (Pilgrim, 2019; Pratten, 2013). However, a critical-realist stance does not imply that a process approach must replace all instances or aims of a sub-stance approach in psychological science. This is also something that we do not wish to convey in this book. Instead, we wish to clarify that a process

approach (and its corresponding theories and methodologies, which we will delve into in Chapters 2, 5, 6, 8, 10, and 11) is most useful and appropriate for understanding psychological processes, while many practices within a substance approach are useful when interested in population distributions. We illustrate these differentiated aims and their relation to a substance versus process approach in Chapters 4 and 5 for the case of self-esteem research.

Here, an additional element of our critical-realism stance becomes apparent – *judgmental rationalism*. This is the premise that some accounts about the world are more likely to be true than others, in a particular context. Context, here, refers to a specific phenomenon being studied and a specific scientific aim. For the substance and process approaches to peacefully co-exist in psychology – reaching true pluralism – it is crucial that we critically assess the suitability of a given epistemological approach in relation to a given phenomenon and aim (Chang, 2019).

We must therefore acknowledge that a processualist has specific aims, which necessitate certain meta-theoretical accounts and methodological approaches. Generally speaking, the most pivotal questions to ask from a process approach are of *becoming* rather than *being*, and of *how* rather than *what* (Rescher, 2000). It should be clear that studying 'becoming' and asking 'how' by no means excludes the study of 'being' and the asking of 'what'. Therefore, a suitable aim for the substance approach is to understand distributions of relatively stable dispositions (i.e., the 'what' of 'being'). This aim is compatible – but separate from – the process-approach aim to understand 'how' these dispositions came to be and are evolving (i.e., the 'how' of 'becoming'). The key difference, then, between a substantialist and a processualist at work, would then be one of 'significance, centrality, priority, and emphasis' (Rescher, 1996, p. 31) of substances versus processes, respectively (we describe how the interests of substantialist psychologists *and* processual psychologists may be integrated into a common and pluralist psychological-science practice in Chapter 12).

With this in mind, our aim is to show that a process approach is more suitable than a substance approach for explaining (Chapters 7 and 8) and measuring (Chapters 9 and 10) phenomena, and establishing validity in our field (Chapter 11) in the context of studying *psychological processes*.

In Section 1.3.2 we provide a general description of how a substance and a process approach differ with regard to how they perceive and engage with phenomena. We do so via the different construals of the reality of a roller coaster.

1.3.2   Timescales and the Illusion of Stable Things

What we understand or come to know about a given phenomenon – even something as seemingly self-evident as a roller coaster – is highly dependent on the approach we take when looking at it. We show here that, to see the processual properties of a given thing, one must look at that thing in the context of time: its temporal order.

At first glance, one may argue that the understanding of a roller coaster requires – and supports – a substance approach. It is counterintuitive to call a roller coaster a process, as the event of a roller-coaster ride entirely depends on the presence of an enduring, static, and a-temporal physical structure, instantiated in the form of an *object* called the 'roller coaster'. And indeed, the characteristics of this structure can clearly be the object of study. Such an approach, however, negates some important properties of the roller coaster, which can only be understood when considering how the roller coaster is situated in multiple timescales.

First, one might consider that an important property of the roller coaster is the *event* of the roller-coaster ride. The function of the roller coaster is to enable an activity, a very dynamic one at that. This property is a process-based one, where the roller-coaster ride takes place at the relatively small timescale of minutes.

Second, the event of the roller-coaster ride itself demonstrates flux. Interestingly, the speed of the roller-coaster carts increases over the course of the day due to greasing of the wheel bearings, which warms them up.[1] Come evening, when the roller-coaster ride is closed, the carts do not move, and the wheel bearings cool down again. There is thus a daily cycle of warming up that gives rise to a slow increase in speed; a process that takes place at the timescale of a day.

Third, even the structure of the roller coaster itself cannot be fully understood based on its static features, as this structure was of course physically *constructed*. This property is one of *becoming*, and takes place at the relatively large timescale of weeks and months.

Fourth, once constructed, the roller coaster is not static. It requires constant maintenance and upkeep. It needs to be constantly checked and greased, and worn out parts have to be repaired or replaced entirely. This process of *maintenance* takes place at the timescale of months and years.

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[1] For further details, see www.coaster101.com/2010/09/27/coasters101-what-influences-train-speed/ and www.youtube.com/watch?v=zi4piO1gK7g.

And finally, these timescales are intimately intertwined. For one, the time that it takes to design and construct the structure of the roller coaster will be partly determined by the ride that it is intended to provide, whereby a simple ride will require a shorter and more basic structure than a roller coaster that is intended to send its passengers in loops and free falls. The former will thus require less time to design and to construct compared to the latter. In addition, the repairs and maintenance that must take place may be a function of how intensely the roller coaster is used. And, of course, the ride – in the sense of a temporal sequence of events – is dependent on the physical structure of the roller coaster. Any obstruction of the structure will immediately halt the activities of the roller coaster.

Therefore, to an observer of the roller coaster at any given moment, the roller coaster may appear to be a static, unchanging metal structure. The timescale of that observation is too small to notice the dynamics of the roller coaster, such as its wear and tear and repair thereof. Moreover, for a passenger of the roller-coaster ride, there is no point in worrying about the intrinsic dynamic nature of all the materials that make up the roller-coaster structure, or about the external forces that are required to maintain its safety. Essentially, it is perfectly normal for an observer or passenger of the roller coaster to *bracket* the process characteristics of the roller coaster. This bracketing (or *Einklammerung* in German, which sounds much more interesting) was described in Edmund Husserl's phenomenology as the suspension of engagement with the processes underlying a stable substance or structure. It is a form of reductionism, whereby the long-term processes of emerging stability are reduced to the short-term experience of the here and now: the roller-coaster ride.

As we will explore in Chapters 4, 6, 7, and 9, it is common to bracket the process nature of things that we interact with, especially when we want to characterize them via quantified measurements. Bracketing the process nature of something may free us from worrying about the state of flux of our reality that we rely on, live with, and attempt to measure. However, any apparent stability results from past and ongoing constructive and maintenance processes, much like the roller coaster. Moreover, our interacting with that reality influences the stability of these structures (like the cumulation of passengers riding on the roller coaster). And while the apparent stable features of our reality – physical or psychological – can be understood at any given moment using a substance approach, it would be incorrect to claim that this approach fully elucidates the ontology of these things. Indeed, underlying any apparent stability is a dynamic interconnection of short- and long-term processes, which require a process approach to understand.

1.4   A Non-Linear Roller-Coaster Ride through the History of Process Philosophy

1.4.1   Philosophical Origins

Thus far, we have given a general description of what a process approach is, where it fits in with a pluralist approach (allowing for epistemic relativity) to the understanding of reality, and why it is necessary to delve into the process nature of phenomenon. We explained how these epistemological arguments stem from process philosophy. Here, we provide a brief historical account of process philosophy.

The father of process philosophy is the Greek philosopher Heraclitus of Ephesus, who lived around 500 BCE (*c.*535–*c.*475 BCE) and was called the 'dark' or obscure philosopher because his – very scarce – writings are indeed very hard to understand if you take them literally.[2] Heraclitus is probably best known for the statement *panta rhei*, which means *everything moves*. However, we owe this statement to a passage in the *Cratylus*, which is a book written by Plato describing a dialogue between Socrates, Cratylus, and Hermogenes (three Athenian philosophers who lived around the fifth century BCE). Heraclitus' statement is embedded in the following passage, written almost like a modern-day comedy sketch.

SOCRATES: My friend, I have thought of a swarm of wisdom.
HERMOGENES: What is it?
SOCRATES: It sounds absurd, but I think there is some probability in it.
HERMOGENES: What is this probability?
SOCRATES: I seem to have a vision of Heracleitus saying some ancient words of wisdom as old as the reign of Cronus and Rhea, which Homer said too.
HERMOGENES: What do you mean by that?
SOCRATES: Heracleitus says, you know, that all things move and nothing remains still, and he likens the universe to the current of a river, saying that you cannot step twice into the same stream.
HERMOGENES: True.[3]

This passage reveals Heraclitus' ideas about how things are always moving, and as such, that any two instances of observing (or interacting with)

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[2] If you speak Dutch and you have sufficient knowledge of *Star Wars*, you'll probably understand why Heraclitus is the Dark Vader of process philosophy.
[3] Plato, *Cratylus*, 401e and 402a. http://data.perseus.org/citations/urn:cts:greekLit:tlg0059.tlg005 .perseus-eng1:402a.

something will not be the same. Since all thoughts of Heraclitus have come to us through the reconstruction of his ideas by other, later philosophers (as illustrated), there is a lot of debate on what Heraclitus truly would have said. According to Kahn (1979), the most directly Heraclitean of all river fragments is the one that says 'as they step into the same rivers, other and still other waters flow upon them' (pp. 166ff., see also Graham, 2008).

The main philosophical point is that things obtain sameness in their identity through their changes, or from the way they change. The identity or sameness of a particular individual person – Paul Van Geert, Naomi De Ruiter, or the current reader of these lines – is that of the individual's patterns and processes of change. We are our processes, all the way down to the timescale of the processes that go on in the cells and molecules that constitute our bodies. This philosophical premise was described in Section 1.2.2.

The metaphor of the river – and the broader issue of change and identity in flux – is in fact part of Heraclitus' major doctrine of the unity of opposites, such as sleep and waking, warm and cold, delight and disgust, approach and avoidance, and so forth. If such opposites were enduring[4] substances, if they were separate 'things' with an unchanged and fundamental essence, a doctrine of unity of opposites would be irrational or illogical. For Heraclitus, the unity consists of their being linked by processes of change or transformation: warm turns into cold and cold turns into warm, approach turns into avoidance and avoidance into approach. There is thus a cycle of transformations from one opposite to another, thereby uniting them. For Heraclitus, the world is 'a manifold of opposed forces joined in mutual rivalry, interlocked in constant strife and conflict' (Rescher, 1996, p. 9). In the same way, individuals may leave behind old qualities or characteristics, while others are more of a cyclical transition between recurring qualities. This brings us back to the notion of humans as 'becoming' rather than as 'being', introduced earlier in this chapter.

The typical antagonist of Heraclitus is his near contemporary Parmenides of Elea, who developed a metaphysics of timeless, unchanging and uniform existence, denying the existence of change. For him change is an illusion resulting from the working of our perception. Parmenides' view on the unchanging nature of existence led to the atomism of Leucippus and Democritus, stating that the world ultimately consists of unchanged and

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[4] There is quite some discussion on the meaning of the word 'perduring' versus 'enduring', see for instance Seibt (1997, pp. 148ff.) and Noonan and Curtis (2018).

unchangeable elementary building blocks, the atoms, the configurations of which form all the objects and properties that we can perceive in the world. Parmenides had a strong influence on Plato, whereas Aristotle was influenced by Democritus' ideas.

As Plato and Aristotle had a great influence on Western metaphysics and science, the tacit opinion of current science – and by implication also of psychology – about the ultimate nature of reality is primarily an inheritor of Parmenides, rather than of Heraclitus. The heritage consists of the role of time and change, which are treated as added, secondary properties instead of fundamental and defining features. A belated echo of the Parmenidean view on change as a basically deceptive feature is the way psychology commonly treats variability and fluctuation, namely as measurement error, or as a phenomenon caused by other factors than the underlying, measured factor (think, for instance, about the distinction between 'trait' and 'state' self-esteem; see Chapter 4).

If you travel upstream the river of thought that originated in pre-Socratic philosophy, you will find that it splits into two tributaries, one representing the metaphysics of change, the other the metaphysics of enduring substance or essence. A philosopher such as Aristotle, who has been so important for the development of Western science, is rowing his boat just before the river forks, although it seems as if he is going to opt for the substance- rather than the process-branch.

To illustrate this somewhat ambiguous nature of Aristotelian philosophy,[5] let us look at the important distinction between *potentiality* and *actuality*. Potentiality is the possibility of something to do a particular kind of thing, to change in a particular way, or to do a particular sort of 'work' that can affect certain things. The Greek word for potentiality is *dunamis*, which we recognize as the root of the word dynamic. It refers to the concept of forces as the potentiality of doing a particular kind of work (as in thermodynamics, studying the work that can be done by heat). If it is applied to persons, it refers to these persons' ability to do something, to change in particular ways. That is, it refers to the abilities, which are defined as a potential for change or activity that is an intrinsic property of some sort of thing. In this sense, we come close to the concept of an ability as a substance, an enduring essence, a stable property or component in the

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[5] On this ambiguity – or rather, richness – of Aristotle's philosophy, see among others Seibt (2002) and Gill (2003), who defends the position that Aristotle was in fact a dynamicist, and that the notion of substance needs to be understood in dynamic terms, as the dynamics that 'stands under' all natural phenomena.

person, that can be expressed in the form of doing certain things (such as giving a right answer to an item in an intelligence test).

The complementary term of potentiality is actuality. For Aristotle, actuality had two sides. One was what he called *energeia*, which means something like 'being in a state of doing what one is supposed to do', for instance, like when an intelligent person is solving a difficult problem that requires a lot of intelligence, or when a depressed person is ruminating and entertaining negative thoughts. Psychologists would probably call this *behaviour*, which is the actualization of a particular disposition (for example, an ability, capability, or psychopathology; Von Wachter, 2009). The other side of actuality is *entelechy*, which is the realization of a particular potentiality. This is the notion of actuality that features in psychological ideas such as self-actualization, but also in the concept of development (de-velop goes back to a Latin stem that means unwrapping, and in Germanic languages such as Dutch or German the word for development is *ontwikkeling* or *Entwicklung*, which is literally unwrapping or unfolding). Aristotelian distinctions thus continue to run through the discourse of modern psychology.

A perennial problem with the distinction between potentiality and actuality, or disposition and behaviour, is that one cannot be defined without the other. The only way to know about the potentiality of a thing or person is by the actual expression of that potential through behaviour. On the other hand, the actual expression derives its meaning from the disposition that it is thought to represent (for example, sleeping badly is only a symptom of depression if there is an underlying depression). The two are intimately and circularly connected. Therefore, a dualistic perspective of the two is likely not complete or accurate and most likely grounded in a reductionistic belief that 'real' explanations require underlying enduring essences, substances or qualities.

1.4.2   *The Branching Off of the Forked River: Process Philosophy*

After Aristotle's somewhat ambiguous commitment to a process versus substance ontology of things, we find many philosophers who explicitly developed a more radical process philosophy. Here, there are roughly two main bodies of literature that demonstrate a commitment to process philosophy. The first body of literature comes from the sciences of the living, biology in the first place, with its discoveries of the process of evolution, development of the individual organism and human history. It is the basic justification for philosophers such as Hegel (in human history), Bergson (biological growth and evolution), Dupré and Nicholson (2018), and

arguably one of the most important process philosophers, Alfred North Whitehead (see also Rescher, 1996 and Seibt, 2020, who have further explained and clarified Whitehead's account of process philosophy).

The second body of literature comes from the physical sciences, and the recent developments in quantum physics in particular. As Bickhard (2016, p. 24) describes, at its foundation the world consists of 'quantized excitations in quantum fields', not particles or enduring substances that are reminiscent of the pre-Socratic atoms. The Russian-born, Belgian chemist and Nobel Prize winner, Ilia Prigogine, has been an important advocate of the idea that modern physics, thermodynamics in particular, supports a process rather than a substance view of nature. As the title of one of his best-known books testifies, we must change our view of reality as a matter of being to a matter of becoming (Prigogine, 1980).

In his overview, Rescher (1996) provides an account of process philosophers that jumps from the ancient Greeks to Leibniz (1646–1717), and goes on with Hegel (1770–1831), Peirce (1839–1914), James (1842–1910), Bergson (1859–1941), Dewey (1859–1952), Whitehead (1861–1947) and finally Sheldon (1875–1981). Readers might notice that this list includes two psychologists, James and Dewey (and we believe it should include Bickhard, as a radical process theorist and interactionist; Bickhard, 2009a, 2009b, 2016). This contrasts with the relative lack of process accounts in psychology that we outlined throughout this chapter (where some more recent exceptions are, for example, Dafermos, 2020; Hibberd, 2014; Witherington & Heying, 2015). The scarcity of process philosophy in psychology is despite the fact that human experience has quite classically been conceptualized as a continuous and complex flow of events, for instance, in the process philosophy of William James.

1.5   It's All Greek to Me: Concluding Remarks

While it may be easy to dismiss metaphysics or ontology as ancient or obscure philosophical accounts that no longer have a place in modern-day psychology, we believe that these accounts show their face in all layers of psychology today. What we aim to show with this book is how psychological research is an ongoing *praxis*, or a whole of practices, ways of doing, ways of asking questions, patterns of communication, interacting researchers and applied practitioners. Furthermore, this praxis enacts particular accounts of metaphysics and ontology – of 'the way the world is'. Beliefs or assumptions about metaphysics and ontology are likely to be implicit in this praxis, in that they almost completely escape reflection. Yet despite

this implicitness (or perhaps because of it), these underlying metaphysical or ontological assumptions are robust, self-perpetuating, self-reproducing and thus very hard to change.

We will show throughout this book that the underlying metaphysics and ontology enacted by the standard practices of current psychological research amounts to an ontology of substances: assumptions about 'things' (e.g., psychological constructs) as a-temporal and enduring, and we show how complex dynamic systems can aid a shift toward a process-ontology praxis. This shift will necessarily include the re-conceptualization of psychological constructs, the nature of the questions asked, research methodology, and research norms.

In line with our pluralist, critical-realist view we argue for a thorough reflection on the implications of a substance- versus process-oriented ontology. What does this contrast reveal about the nature of psychology's subject? What is it that psychology focusses on, tries to understand and eventually change? The questions will be answered via our own reflections throughout this book.

The emergence of a processual alternative to the dominant substance-oriented praxis of psychology leads to various possible scenarios. One scenario is that the 'best' praxis – in terms of explanatory value and success of applications and interventions – will replace the other one. Another scenario is that a processual praxis branches off from the current praxis and both continue without any significant form of interaction, more or less like two biological species that originated from a common ancestor and that are no longer capable of interbreeding and producing viable offspring. Both scenarios would run against our pluralistic beliefs, namely that the subject of psychological science can most fruitfully be approached from distinct perspectives, including different ontologies. However, this pluralism implies an awareness of the ontological choices implicit in the different praxes involved. A third scenario is that of an integration into a larger praxis – and its associated ontology – of complementarity (e.g., Kelso & Engström, 2006). This is a kind of Hegelian synthesis of antithetic positions. This book invites the reader to reflect on these possible scenarios and their implications for the nature of psychological science (and we offer an imaginary possibility in our final chapter of the book, Chapter 12).