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Interpreting “personality” taxonomies: why previous models cannot capture individual-specific experiencing, behaviour, functioning and development. Major taxonomic tasks still lay ahead

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REPRINT

Original Article

Interpreting "personality" taxonomies: Why previous models cannot capture individual-specific experiencing, behaviour, functioning and development.
Major taxonomic tasks still lay ahead

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Abstract

As science seeks to make generalisations, a science of individual peculiarities encounters intricate challenges. This article explores these challenges by applying the Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm) and by exploring taxonomic "personality" research as an example. Analyses of researchers' interpretations of the taxonomic "personality" models, constructs and data that have been generated in the field reveal widespread erroneous assumptions about the abilities of previous methodologies to appropriately represent individual-specificity in the targeted phenomena. These assumptions, rooted in everyday thinking, fail to consider that individual-specificity and others' minds cannot be directly perceived, that abstract descriptions cannot serve as causal explanations, that between-individual structures cannot be isomorphic to within-individual structures, and that knowledge of compositional structures cannot explain the process structures of their functioning and development. These erroneous assumptions and serious methodological deficiencies in widely used standardised questionnaires have effectively prevented psychologists from establishing taxonomies that can comprehensively model individual-specificity in most of the kinds of phenomena explored as "personality", especially in experiencing and behaviour and in individuals' functioning and development. Contrary to previous assumptions, it is not universal models but rather different kinds of taxonomic models that are required for *each* of the different kinds of phenomena, variations and structures that are commonly conceived of as "personality". Consequently, to comprehensively explore individual-specificity, researchers have to apply a portfolio of complementary methodologies and develop different kinds of taxonomies, most of which have yet to be developed. Closing, the article derives some meta-desiderata for future research on individuals' "personality".

Key words:

personality functioning and development; phenomenon-methodology matching; between-individual and within-individual differences; nomothetic and ideographic approaches; standardised questionnaire methods; traits; Big Five Model and Five Factor Model; Compositional Structures and process structures; personality model and taxonomy.

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To answer the fundamental question "Why do individuals differ?", researchers have invested great efforts in establishing "personality"¹ models over the last century with the aim of providing comprehensive accounts of individual peculiarities and of exploring the mechanisms and processes that can explain individual functioning and development. Today, there are many competing models from different lines of research each based on different theories and different images of human nature (Fahrenberg 2004; Shotter 1975) and each derived and applied using different methodologies (Mischel, Shoda & Ayduk 2007).

Many controversies ensued among the proponents of different models and theories. A central controversy arose with regard to the scientific dictum *scientia non est individuorum*—the fundamental idea that science seeks regularities and lawfulness through abstraction and generalisation from unique events and thus, cannot be devoted to exploring individual cases. To establish the discipline's status as a science, many psychologists therefore employ nomothetic approaches (from the Greek *nomos*, the law) that aim to identify universal principles and generalised concepts that are applicable to all individuals in the same way. But from the very beginning, many other psychologists have pointed out that universal and generalised concepts cannot appropriately represent the particular individual as he or she is encountered in research, clinical settings and everyday life nor can they explain individual functioning and development (Allport 1937; Kelly 1955). These psychologists therefore reject the idea that "the unique individual is simply the point of intersection of a number of quantitative variables" (Eysenck 1952, p.18) and advocate for pursuing *ideographic* approaches (from the Greek *ideos*, the peculiar) to seek a holistic understanding of the single individual (Lamiell 2003; Salvatore & Valsiner 2010; Salvatore et al. 2013).

Other controversies occurred over the question of what "personality" actually *is*. Some researchers conceive of "personality" as socially attributed and socioculturally constructed (Kelly 1955; Shweder & Sullivan 1990), thus involving social perception and judgement (Goldberg 1990; John, Angleitner & Ostendorf 1988). Some researchers who focus on *external* perspectives on individuals take into consideration not only behaviour but also morphology (Eysenck 1947; Guildford 1959), whereas others explicitly do not (Norman 1967). Some other researchers, in turn, focus on *internal* perspectives on individuals by conceiving of "personality" as the dynamic organisation of their psychophysical system (Allport 1937). Still other researchers incorporate both external and internal perspectives by considering individuals' behaviours and their thoughts and emotions (Pervin & John 1997).

Further controversies arose with regard to whether "personality" reflects rather stable inner *structures* or *dynamic processes* (Fleeson 2001; Giordano 2014; Mischel & Shoda 1998). Proponents of structural concepts have debated about the numbers and qualities of the particular constructs that constitute taxonomic models (Ashton & Lee 2005; Cloninger 1986; Costa & McCrae 1992; Goldberg 1990; Tellegen 1993). Controversies about causal explanations arose on the concepts of *human nature* (Fahrenberg 2004; Shotter 1975) on which different research paradigms are based. At their core, these controversies revolved around the question of whether individuals are influenced more by their internal properties or by their external contexts in a given moment (cf. the *person-situation controversy*; e.g., Bandura 1986; Mischel 1968) as well as across their lifetime (cf. the *nature-nurture controversy*; e.g., Freud 1915; Loehlin 1992).

Contemporary psychologists recognise that various research perspectives are important for exploring why individuals differ and increasingly integrate formerly competing theoretical perspectives (e.g., biological, psychodynamic-motivational, behavioural-learning, social-cognitive and humanistic perspectives) as interconnected levels into overarching "personality systems". But can such integrative models really provide "a much more coherent view of the whole functioning individual in the social world" (Mischel, Shoda & Ayduk 2007) as frequently assumed? Why then did the controversies arise in the first place? What

¹ The term "personality" put in quotation marks indicates that its definitions vary and that different researchers use this term to refer to different kinds of phenomena (see Uher 2014a, b in this trilogy).

actually is at the bottom of all these controversies? How can they be resolved—and have these controversies actually been resolved?

This trilogy of articles

This trilogy of articles (Uher 2014a, b, c) applies the Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (briefly referred to as the TPS-Paradigm) to explicate and critically examine the basic metatheories and methodologies that researchers explicitly and/or implicitly apply to explore individuals using the example of taxonomic "personality" research.

The first article (Uher 2014a) highlighted some profound challenges that researchers of individuals encounter. It introduced basic fundamentals of the TPS-Paradigm focussing on the philosophical presuppositions that it makes about research on individuals including basic epistemological and metatheoretical concepts for exploring individuals as living organisms. Philosophy-of-science foundations underlying research methodologies in general and scientific quantification in particular were elaborated to derive basic principles for the targeted matching of methodologies to each of the various kinds of phenomena explored in individuals. On the basis of these foundations, the article then explored the metatheories and methodologies that are used and/or needed to investigate each given kind of phenomenon in *individuals in general*. Building on these general implications, the article derived special implications for exploring individuals' "personality" that the TPS-Paradigm conceives of as *individual-specificity* in all of the various kinds of phenomena explored in individuals.

The second article (Uher 2014b) elaborated the special implications for research on individual-specificity and applied them to explore the three methodological steps that are required for developing comprehensive "personality" taxonomies—1) the approaches used to select the phenomena and events to be studied, 2) the methods used to generate data about the selected phenomena and events and 3) the reduction principles used to extract the "most important" kinds of individual-specific variations and to construct taxonomies. By analysing some currently popular taxonomic models as examples, frequent mismatches were revealed in all three steps between the researchers' (explicit and implicit) metatheories about "personality" and the abilities of previous methodologies to capture the particular kinds of phenomena toward which they are targeted. It was shown how erroneous assumptions and the widespread psychometric practice of radically matching the methodological tools (e.g., standardised questionnaires) to researchers' preconceived ideas and to pre-existing statistical theories have seriously hampered taxonomic investigations of the various kinds of phenomena explored in individuals. For all three steps of taxonomy development, the article highlighted ways in which methodologies that are suitable for comprehensively identifying individual-specificity can be derived and (further) developed from both established and novel theoretical approaches.

The present third article (Uher 2014c) builds on the insights gained in the two previous articles in order to explore researchers' theoretical interpretations of previous taxonomic "personality" models, constructs and data regarding the phenomena that these represent. After summarising and elaborating on some relevant fundamentals of the TPS-Paradigm (part I), the article presents (part II) philosophy-of-science analyses that reveal widespread erroneous assumptions, rooted in everyday thinking, about the abilities of previous "personality" taxonomies to appropriately represent the targeted phenomena. In line with concerns that have been voiced repeatedly, the article shows that previous taxonomic models have largely failed to empirically represent individual-specificity in experiencing and behaviour and in individuals' functioning and development—psychology's core objects of research. The article then (part III) derives implications for comprehensive explorations of individual-specificity and offers novel insights about the different kinds of taxonomic models that are required to comprehensively explore individuals' "personality" and that have yet to be developed. Closing (part IV) the philosophy-of-science analyses presented in this trilogy, the article derives some meta-desiderata for future research on individuals and on "personality".

I) The Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm)

The philosophical, metatheoretical and methodological foundations of the TPS-Paradigm are based on various lines of thought from both philosophy and psychology. Space constraints limit the degree to which these historical precursors and other related lines of research can be referred to in this trilogy and to which meaningful links exist that can be further explored and developed. This article can also introduce only those fundamentals that are directly relevant for the analyses presented with regard to researchers' theoretical interpretations in taxonomic "personality" research (for details see Uher 2014a, b in this trilogy). For more comprehensive accounts of the TPS-Paradigm and its links to other lines of thought see Uher (2014d, in prep.²).

Philosophical foundations

The TPS-Paradigm for Research on Individuals applied in this trilogy is a *paradigm* because it comprises interrelated philosophical, metatheoretical and methodological frameworks for exploring individuals. It is *transdisciplinary* because in these frameworks, concepts, approaches and methods from various scientific disciplines are systematically integrated, further developed and complemented by novel ones (Uher 2011a; 2013). It is called a *philosophy-of-science* paradigm because it emphasises the importance of making explicit the philosophical presuppositions that are being made in a given scientific system and the metatheories and methodologies that are derived from them and it aims to make these explicit in the fields that it explores.

Philosophical presuppositions are rational structures that are necessary for any scientific system to function and that can originate only from outside the given system that is built upon them and in which they guide the development of theories and methodologies. For this reason, philosophical presuppositions cannot be rationally justified or validated within the system for which they are formulated (cf. incompleteness theorem; Gödel 1931) and are therefore also called *absolute presuppositions* (Collingwood 1940). Philosophy-of-science analyses are important for revealing possible differences in the absolute presuppositions that are being made in a field and in order to enable comparisons and controversial discussions between different lines of research that are based on the same or similar presuppositions.

For example, the major schools of thought developed in "personality" psychology each comprise coherent sets of statements, theories and methods but still tend to be contradictory or even irreconcilable with one another because they are based on different absolute presuppositions (Fahrenberg 2013; Walach 2013). Specifically, biological, psychodynamic-motivational, behavioural-learning, social-cognitive and humanistic research traditions in psychology are each based on different absolute presuppositions about human nature, amongst others. In view of their increasing integration as "interconnected levels" into overarching "personality systems" (e.g., Mischel et al. 2007), one must ask which particular philosophical presuppositions will allow researchers to resolve the contradictions between these very different scientific systems? In what ways can "personality systems" comprising contradictory absolute presuppositions and thus different or even opposing metatheories and methodologies provide "a much more coherent view of the whole functioning individual in the social world" (Mischel et al. 2007)? Or rather, are such "integrative systems" not merely providing important overviews of the essential plurality of research perspectives and methodologies that are required to comprehensively explore individuals (see below; cf. Fahrenberg 2008, 2013; Uher 2014a; Wong 2009; Wundt 1894, 1920, 1921)?

The TPS-Paradigm explicitly considers the additional intricacies with which researchers of individuals and of "personality" are confronted because the researchers themselves are always individuals with their own particular viewpoints, abilities and "personality" and thus, not independent from their particular objects of research. "Objectivity" can therefore be only *intersubjectivity* that can be reached only on the basis of shared

² To appear in the *Annals of Theoretical Psychology*, vols. 12, 13.

philosophical presuppositions. This non-independence from the objects of research and the fact that it is the researchers' abilities through which all science is made entail considerable risks for anthropo-, ethno- and ego-centric biases as well as for various fallacies of the human mind, such as those that cause researchers to oversimplify complexity (Royce 1891) and to reify linguistic abstractions (Whitehead 1929). Biases and fallacies can occur in researchers' *metatheories*—in their basic assumptions about how to demarcate scientific phenomena, what to consider to be facts and how the thus-defined facts can be theoretically analysed and in researchers' implicit and explicit beliefs and theoretical ideas about their objects of research and the questions that they ask about these objects. Biases and fallacies can also occur in researchers' *methodologies*—in the ways (i.e., approaches) in which they tackle these questions and in the techniques (i.e., methods) that they use to do so (for details see Uher 2014a, b in this trilogy).

The following outlines the absolute presuppositions that the TPS-Paradigm makes about research on individuals and presents basic metatheories and methodologies that are derived from these presuppositions and that are relevant for the analyses presented in this article. These elaborations are made to enable comparisons and controversial discussions with other lines of research in the field that are based on the *same* or similar presuppositions (Uher 2013, Desideratum 1g). Researchers making other absolute presuppositions must develop and use metatheories and methodologies other than the ones that are analysed in this trilogy, thus precluding direct comparisons.

Presuppositions made about individuals as living organisms

The TPS-Paradigm considers that individuals are living organisms. Living organisms can be conceived of as *systems* composed of sets of interrelated elements (von Bertalanffy 1973) that are compounded into *new* elements at the next higher level of organisation (e.g., atoms, cells, organs, individuals; Caprara 1996). At each level of the systemic structure, compositional elements function together as a *whole*. This whole has different properties and functionings than the elements of which it is composed (*principle of emergence*). Therefore, identifying lower-level compositional structures cannot reveal the processes that govern how the compositional elements function and develop together as a whole at each particular level of organisation (e.g., Hartmann 1964; Rothschuh 1963; von Bertalanffy 1937; Wundt 1863). Assumptions of *isomorphisms* between elements on different levels (in all directions) can therefore be misleading, especially when phenomena of different kind are involved (see below; Bohr 1937; Koffka 1935; Köhler 1969; Mayr 1988).

Given this, interrelations between elements can be conceived of as *causal connections* (Kausalzusammenhänge) only in some cases. Rather, *compositional connections* (Gefügezusammenhänge; Rothschuh 1963) must be conceived in which the elements co-occur in coordinated ways and match and interact with one another such that the entirety of their joint interactions results in complexes of higher organisation and that the presence or absence of single elements or single interrelations can fundamentally change their overall interactions (e.g., the various enzymes and pH-values that are involved in the metabolic processes in the mouth, stomach and intestines and that co-occur in a fine-tuned spatial and temporal proximity and in a specific order; Rothschuh 1963). Moreover, in different systemic contexts, different properties and functionalities can emerge from the same set of elements (*multi-contextuality*; Bronfenbrenner 1979; Lewin 1936). Metabolic enzymes that are active in the stomach cannot unfold the same properties and functionalities in the intestines.

As living organisms, individuals can be conceived of as *self-organising* systems. Therefore, individuals and their various internal (e.g., physiological) subsystems are *self-referential* to a considerable extent (Fahrenberg 2013; Luisi 2003; Varela, Maturana, & Uribe 1974; Maturana 1975). In their processes of self-organisation, interactions between elements can result in lasting changes of the interacting elements in and of themselves as well as of their interrelations (i.e., *dialectical processes*; Rychlak 1968; Sameroff 2010). In addition, individuals can also be conceived of as open (i.e., *dissipative*) systems that

exchange with their surroundings and that develop non-linear system dynamics. Each event can be dynamically interrelated to and co-determined by all concurrent events internal and external to the individual as well as by past events within the same individual (cf. Lewin 1935; Pauli 1927). The organisms' future development therefore cannot be predicted with certainty and in their microgenetic, ontogenetic and phylogenetic development, irreversible processes may emerge that may be historically unique and never repeatable (Baldwin 1896; Caprara 1996; Li 2003; Prigogine 1996; Valsiner 2000).

These philosophical and metatheoretical considerations of living organisms illuminate that structural approaches and process approaches in "personality" research take different perspectives on individuals. As science seeks to make abstractions from unique events to identify regularities and structures that may allow generalisations to be made at least to some extent, the TPS-Paradigm refers to these different perspectives more precisely as explorations of *compositional structures* and explorations of *process structures* (see part III below; Uher 2011a). This differentiation of structures of different kind is elementary for research on "personality" because the identification of what is specific to a particular individual presupposes explorations of the ways in which individuals differ from one another (Uher 2013). But explorations of differences between individuals are not suited to explore the functioning of a particular individual given that individuals, as living organisms, are inherently self-organising and therefore self-referential to a considerable extent. Thus, methodologies applied to study between-individual differences and methodologies applied to study within-individual processes reveal different and apparently unrelated kinds of information about individuals. But these different kinds of information are both important for exploring "personality" and may thus be conceived of as complementary to one another.

The epistemological principle of complementarity

Bohr (1937) introduced the principle of complementarity in quantum physics as a solution for the wave-particle dilemma in research on the nature of light. He pointed out that, by using different methods, apparently incompatible kinds of information can be obtained about the properties of the same physical object. These different properties seem to be maximally incompatible with one another but are both equally essential for an exhaustive account of the results obtained, and may therefore be regarded as complementary to one another. Given this, the Bohrian principle of complementarity rejects methodological compromises while implying no limitations to the application of particular methods to describe and explore particular objects of research. Instead, the principle argues for analysing the presuppositions and the appropriateness of the conceptual structures involved, and for conceiving for the different properties under study different frames of reference that are categorically different, self-contained, mutually complementary and that are all essential for exploring the particular object of research.

Bohr (1937) explicitly stated that this principle of complementarity could prove to be an epistemological principle that is also helpful in the life sciences where many phenomena exhibiting pairs of complementary properties are being explored, in particular in biology and psychology, such as the psyche-physicality problem (i.e., body-mind problem) in which this principle adopts a metaphysically neutral position without presuppositions of either monism or dualism (cf., Fahrenberg 1979, 1992, 2013; Hoche 2008; Kant 1798; Walach 2013; Wundt 1894).

The TPS-Paradigm adopts the presuppositions of this epistemological principle and applies them to fundamental questions in research on individuals and on "personality" (for details, see Uher 2014a in this trilogy). These absolute presuppositions are applied in this article (in part II) to explore the different perspectives that researchers take on "personality" when interpreting between-individual and within-individual structures. Thereafter, these absolute presuppositions are applied (in part III) to derive specific implications for the targeted and complementary application of between-individual and within-individual methodologies for enabling comprehensive taxonomic explorations of individuals' "personality".

The TPS-Paradigm's elementary system of three metatheoretical properties

The absolute presuppositions of epistemological complementarity are fundamental to the TPS-Paradigm. Specifically, it emphasises the necessity of considering—both theoretically and methodologically—the metatheoretical properties that can be conceived for the various kinds of phenomena explored in individuals. The particular presuppositions that it makes about phenomena and their properties are specified in the elementary system that constitutes an essential core component of this paradigm.

As all science is made by human individuals, the TPS-Paradigm conceives of anything that is perceivable or conceivable by humans as a *phenomenon*; this terminology differs from various historical traditions of thought (e.g., Kant 1781; see Uher 2014a in this trilogy). Various kinds of phenomena (i.e., morphology, physiology, behaviours, the psyche, semiotic representations, artificially modified outer appearances and contexts; for their specification, see below) are differentiated from one another on the basis of three metatheoretical properties that can be conceived for these phenomena: 1) their spatial location in relation to the material entity of the individual, 2) temporal extension and 3) physicality versus "non-physicality". The TPS-Paradigm considers these particular metatheoretical properties because the particular *constellation of the forms* that can be conceived for each given kind of phenomenon *unequivocally* determines its accessibility by individuals and thus also by researchers. Consequently, these properties also determine the accessibility of many further properties that can be perceived in the phenomena under study or can be inferred from them and that are mostly in the focus of research.

In the TPS-Paradigm, the spatial and temporal dimensions of the phenomena under study are considered in the dimensions of everyday life experiences (i.e., spatial dimensions comparable to the human bodies, temporal dimensions of the international time standard) rather than in the dimensions of atoms or the outer space as considered in specific fields of research (e.g., chemistry, quantum physics, astronomy). But regardless of this, these metatheoretical properties are conceptualised on higher levels of abstraction than commonly considered in research on individuals and in everyday life.

Metatheoretical Property 1: Spatial location in relation to the material physical entity of the individual

The TPS-Paradigm conceives of *internality and/or externality* in fundamentally different ways than most previous lines of research on individuals. First, with regard to this property, individuals are conceived of as material physical entities that can be directly perceived in everyday life, rather than as subjectively, psychologically and/or socially constructed entities. Second, externality and/or internality refers to the *particular phenomenon under study* (e.g., behaviour) and *its spatial location in relation to the material entity of the individual under study* because this location determines the phenomenon's direct perceptibility by individuals in everyday life and thus also in research settings. Phenomena that are external to others' bodies (e.g., faces, clothes, trees) can be directly perceived, but this is not possible for phenomena that are located internal to other (healthy and intact) individuals' bodies (e.g., brain, joints; only a few can be directly perceived under particular conditions, e.g., teeth and gums). Internal phenomena can be made perceptible by using invasive and technical methods (e.g., surgery, MRI), but only if these phenomena are physical (see below). Thus, in contrast with previous concepts, the TPS-Paradigm refers externality and/or internality neither to a particular theoretical focus that researchers can take on individuals nor to the perspectives that individuals can generally take on themselves and on others (for details, see Uher 2014a in this trilogy).

Metatheoretical Property 2: Temporal extension

Perceptibility of a phenomenon also requires its presence in the given moments of investigation. Some phenomena are temporally extended (e.g., individuals' physiognomy, monuments). Other phenomena, by contrast, are ephemeral; their occurrence is strictly bound to the present moment in time (e.g., heart beats, gestures). Some momentary phenomena are also highly fluctuating.

Metatheoretical Property 3: Physicality versus "non-physicality"

In the TPS-Paradigm, the *terms physicality and physical* refer to the science of physics rather than to corporality, which cannot be conceived for immaterial physical phenomena in and of themselves. Physicality denotes that, in material physical phenomena, there are *spatial units* that are rather constant and identically repeatable to a considerable extent (e.g., molecules, cells, body parts, houses). Spatial units occurring in the material physical phenomena can be used to identify units in immaterial physical phenomena that do not feature spatial units in and of themselves (e.g., heat, behaviours) but that are systematically related to material physical phenomena (e.g., the individual's body). "*Non-physicality*"³, by contrast, denotes the immaterial properties of the phenomena of the psyche that, in and of themselves, lack not only spatial units (Kant 1798) but also systematic relations to the physical phenomena by which they are accompanied (e.g., brain physiology; Fahrenberg 2008, 2013; Wundt 1894).

The various kinds of phenomena differentiated from one another on the basis of the three metatheoretical properties

On the basis of this elementary system of these three metatheoretical properties, the TPS-Paradigm differentiates from one another various kinds of phenomena explored in individuals. These differentiations are made on the basis of the specific and different constellations of the forms with regard to these metatheoretical properties that can be conceived for each given kind of phenomenon. These particular constellations establish each phenomenon's particular *frame of reference* that is applicable to the other kinds of phenomena only to some degree or not at all. Insufficient consideration of these frames of reference may therefore entail mismatches with the methodologies used for explorations (cf. phenomenon-methodology matching below and in Uher 2014a, b in this trilogy; cf. Uher 2013, Desiderata 1a, 1e, 1f).

Between all kinds of phenomena differentiated, the TPS-Paradigm distinguishes basic kinds from composite kinds of phenomena. The *basic kinds of phenomena* comprise the phenomena of morphology, physiology, behaviour and the psyche because they are *physically inseparable* from the material entity (i.e., the body) of the healthy and fully intact individual. Separations can be made only conceptually as done in the TPS-Paradigm by conceiving and differentiating these kinds of phenomena on metatheoretical levels. *Composite kinds of phenomena* each comprise several different kinds of phenomena, among them at least one basic kind of phenomenon, which is thus inseparable (in the sense stated) from the body of the individual studied. Composite kinds of phenomena may also comprise external physical phenomena that are independent from the studied individual's body. This entails that composite kinds of phenomena are more heterogeneous than each of the basic kinds of phenomena in and of themselves. Of composite kind are the phenomena of semiotic representations, artificially modified outer appearance and contexts. How are these different kinds of phenomena defined and metatheoretically conceived?

*Morphology*⁴ refers to living organisms' bodily structures and their constituting parts. Morphological phenomena can be located internal (e.g., inner organs) or external (e.g., physique) to the studied individual's body; some can also be both (e.g., hair, outer skin). These phenomena are temporally extended, thus not bound to the immediate moment, and they are material physical (e.g., tissue).

Physiology refers to the phenomena of the chemical and physical functioning of morphological phenomena. They are located primarily internal to the studied individual's body (e.g., endocrine hormones), but some can also become external (e.g., breath). Many physiological phenomena are not strictly momentary (e.g., blood fat levels), but some are

³ The term "non-physical" is put in quotation marks in the TPS-Paradigm because it denotes properties that are not simply contrasted against the physical but are complementary instead (see Uher 2014a).

⁴ The terms morphology and physiology denote the organismal structures and functions, in and of themselves, rather than the scientific disciplines that explore these kinds of phenomena.

(e.g., action potentials of nerve cells). All physiological phenomena are physical, though not necessarily material in and of themselves (e.g., heat).

Behaviours are defined in the TPS-Paradigm as the "external changes or activities of living organisms that are functionally mediated⁵ by other external phenomena (Millikan 1993) in the present moment" (Uher 2013; Uher et al. 2013a, Uher et al. 2013b). Functional external changes or activities are behaviours only if their functions have *reference to* other external phenomena or to relations to them. Thus, not all of the individual's external changes or activities are behaviours (e.g., mere chemical by-products such as heat) and vice versa, behaviours are not just movements (e.g., freezing behaviour in prey animals; Millikan 1993). Importantly, neither physiological responses nor mental activities are conceived of as behaviours; this differs fundamentally from some concepts of behaviourist paradigms. Also, the TPS-Paradigm makes no a priori assumptions about the potential causes of behaviours in other kinds of phenomena as implied by concepts of "goal-directed" actions or behavioural "responses" of some cognitivist paradigms. Rather, in line with the epistemological principle of complementarity, it considers that, for other phenomena, different metatheoretical properties can be conceived that require different methodologies for explorations and thus also for explorations of their interrelations with behaviours. Hence, behavioural phenomena are located entirely external to the studied individual's body. Behaviours are momentary and fluctuating; their temporal extensions are often only low. Behaviours are immaterial physical phenomena in and of themselves (e.g., acoustic waves) but bound to the physical matter of individuals' bodies and of their external physical surroundings.

The psyche denotes the entirety of the phenomena of the immediate experiential reality both conscious and non-conscious of living organisms (cf. Wundt 1896). The TPS-Paradigm refers to these phenomena as *psychical* rather than *psychological* because "events, processes and structures that are properly called psychical do not become psychological until they have been operated upon in some way by the science of psychology" (Adams & Zener in Lewin 1935, p. vii). Importantly, the term psychical denotes not only mental but also emotional, volitional and other kinds of psychical phenomena that are always part of individuals' immediate experiential reality as well (Wundt 1896). The TPS-Paradigm also considers that not all psychical phenomena can be consciously perceived and easily verbalised but nevertheless form important parts of individuals' immediate experiential reality (Freud 1915; Kant 1798; Kelly 1955).

Psychical phenomena are located entirely internal to individuals' bodies. But in contrast to internal physical phenomena (e.g. brain morphology and physiology), psychical phenomena are accessible only by the individual him- or herself and by nobody else (Kant 1786; Locke 1689). The TPS-Paradigm conceives of psychical phenomena as "non-physical"; thus as immaterial and lacking spatial units or spatial dimensions in and of themselves (Kant 1798). Hence, the entirety of psychical phenomena cannot be conceived of as a spatial entity that could be directly perceived as is possible for the individual's body; notions of "the psyche" in the TPS-Paradigm therefore do not and cannot imply reification as a concrete entity. The psyche can only be conceived of as an entity, thus as a constructed entity. "Non-physicality" also denotes that psychical phenomena are lacking systematic relations to the material and immaterial physical phenomena by which are accompanied (e.g., brain morphology and physiology; Fahrenberg 2008, 2013; Wundt 1896).

On a metatheoretical level, the TPS-Paradigm differentiates experiencings from experiences on the basis of their temporal extension. *Experiencings* are strictly bound to the immediate moment and highly fluctuating (Kant 1798; Pauli 1927; Stern 1924; Uher 2013; Valsiner 1998; Wundt 1920). *Experiences* are the *a posteriori* of experiencings; they are *memorised psychical resultants* that are retained from past experiencings in processed and abstracted forms and are therefore temporally more extended. The TPS-Paradigm differentiates two kinds of memorised psychical resultants in line with the presuppositions that it makes about individuals as living organisms. Specifically, it conceives of compositional

⁵ The meaning of the term *mediation* in the TPS-Paradigm refers to the Latin *mediare*, to be in the middle, not to the meaning established in statistics (where it is differentiated from moderation).

structures that are perceived by individuals as the *contents* of their experiential reality (e.g., perceptual representations, self-concepts, beliefs, ideas, knowledge) and of process structures that refer to basic patterns in the *processing* of these contents (e.g., abilities for abstraction and construction, attention and memory span, volition, self-organisation). Memorised psychical resultants of both kind cannot be accessed directly but can only be reconstructed and executed in an individual's ongoing experiencings. Memorised psychical resultants are thus never merely identically repeated but always reconstructed and processed anew in the particular context of their re-activation (Bartlett 1932; Schacter & Addis 2007) before they are reintegrated again into the hitherto reached compositional and process structures of the individual's psychical system that thereby continuously changes and develops (cf. irreversible processes of development; Le Poidevin 2011; Valsiner 2012).

Semiotic representations are conceived of in the TPS-Paradigm as composite kinds of phenomena comprising psychical phenomena (e.g., experiencings, memorised psychical resultants) that are *tightly intertwined* with particular external physical phenomena (e.g., behaviours, paper, ink). As psychical phenomena in and of themselves are imperceptible by others, individuals use these external physical phenomena—because these are perceptible by others—to convey (i.e., *externalise*) the meanings that they construct for their own psychical phenomena such that other individuals can make adequate inferences about these psychical phenomena (Uher 2014d). Meanings of vital importance are externalised in species-specific behaviours in rather fixed ways. In addition, meanings can also be assigned to particular external physical phenomena in arbitrary (and therefore regionally varying) ways. If multiple individuals psychically represent such *assignments* in socially shared ways, the particular external physical events become *signs*. Signs may be either bound to individuals' bodies (i.e., behavioural signs, such as spoken language) or be independent of them (i.e., material signs, such as written language).

Importantly, although many material signs (e.g., texts, monuments) are independent of individuals' bodies, signs cannot be understood without the particular psychical phenomena (e.g., meanings) with which they are tightly intertwined and that first turn these physical phenomena into signs. This is because meanings are not inherent to the particular physical phenomena (e.g., vocalisations, stones) that are used as signs; rather, meanings are only *assigned* to them by particular communities. Dualistic concepts in which signs (e.g., "cultural practices") are explored separately from the individuals who develop and use these signs, such as for exploring the influence of culture on individuals' "personality", therefore inherently entail circularity in exploration. The TPS-Paradigm rejects dualistic concepts and conceives of semiotic representations as *composite* kinds of phenomena in which the physical phenomena that they comprise cannot be understood as signs (e.g., "cultural artefacts") if the psychical phenomena with which they are tightly intertwined are excluded from the considerations made. *Exclusive conceptual separations are not possible*—unless the physical phenomena are considered only as such (e.g., sounds, stones) rather than as signs (e.g., spoken language, hieroglyphs). Instead, the different kinds of phenomena that are comprised by semiotic representations *can be conceptually separated from one another*—and thus from the individuals studied—*only inclusively* (cf. Valsiner 1987). This can be done on the basis of the forms that they take with regard to the three metatheoretical properties that the TPS-Paradigm considers. These differences in metatheoretical properties entail that isomorphisms between the different kinds of phenomena that are comprised by semiotic representations can be only low. Thus, semiotic representations are phenomena of heterogeneous metatheoretical properties and their internal structures are more complex than those of any of the basic kinds of phenomena.

Artificially modified outer appearances are conceived of in the TPS-Paradigm as both the parts of individuals' natural outer morphology that they can change and modify on an individual level (e.g., hairstyle, tattoos) and the physical objects that individuals attach to their bodies (e.g., clothing, accessories). Artificial outer-appearance modifications are located external to individuals' bodies and are primarily material physical. They are temporally more extended than behaviours but less extended than individuals' natural outer

morphology. These physical modifications are often used to represent and convey particular meanings to other individuals (e.g., community membership). Therefore, the TPS-Paradigm conceives of and explores these phenomena as special kinds of semiotic representations that are characterised by their physical attachment to individuals' bodies.

Contexts are commonly conceived of as "environments" that are external to and separate from the studied individuals. Researchers develop such dualistic concepts often with the aim of answering the fundamental question of whether individuals are influenced more by their external surroundings (e.g., situations) or their internal properties (cf. the person-situation controversy). But the same external physical events are not the same for all individuals; rather, individuals interact with only those events that are relevant for them given their particular physical and psychical properties (Lewin 1936; Nagel 1974; Rotter 1954; von Uexküll 1909). Thus, the external physical events constituting an individual's context cannot be identified independently from the individual being studied (Lewin 1936). Moreover, individuals are influenced not only by external events but also by internal events, and these are not only psychical but also physical (e.g., nutritional status). It follows that contextual phenomena cannot be conceived if the individuals studied are excluded from the considerations; thus *exclusive conceptual separations are not possible*. Therefore, dualistic concepts of context inherently entail circularity in exploration (see below, parts II and III).

Therefore, and given the philosophical presuppositions made about individuals as living organisms (cf. multi-contextuality), the TPS-Paradigm rejects dualistic conceptions of *contextual phenomena* and conceives of contexts as *composite kinds of phenomena* that comprise several different kinds of phenomena. Among them—and often in the focus of contextual explorations—is at least one basic kind of phenomenon (i.e., morphological, physiological, behavioural or psychical), which is thus physically inseparable from the studied individual's body. In addition, a given contextual phenomenon may comprise further basic kinds of phenomena and/or external phenomena that are independent from the material entity of the studied individual's body (e.g., other humans, buildings). Hence, contextual phenomena may comprise both internal and external phenomena, both momentary and non-momentary phenomena, and both "non-physical" and physical phenomena; thus, their metatheoretical properties are heterogeneous. This composite conception implies that the different kinds of phenomena that are comprised by contextual phenomena *can be conceptually separated from one another*—and thus from the individuals under study—*only inclusively* (cf. Valsiner 1987). This can be done on the basis of the different forms that they take with regard to the three metatheoretical properties considered in the TPS-Paradigm. These differences entail that isomorphisms between the different kinds of phenomena comprised can be only low, making the structures of contextual phenomena more complex than the structures of any of the basic kinds of phenomena. (Concepts of situations, behavioural situations and culture are defined and explored in Uher 2014a in this trilogy).

Methodological implications derived from the three metatheoretical properties for the elementary problem of phenomenon-methodology matching

The TPS-Paradigm derives various methodological implications from the philosophical presuppositions that it makes about research on individuals. Central is the elaboration of the philosophy-of-science foundations underlying the elementary problem of *phenomenon-methodology matching* in order to derive clear-cut criteria that researchers can use to decide which particular methodologies allow for exploring a particular phenomenon and which ones do not (Uher 2013, Desiderata 1d-f). Such criteria specifying the particular conditions under which a given methodology can be considered to be "appropriate" for exploring a particular phenomenon (as is often voiced) have been missing so far, despite intense debates about this matching problem (cf. the controversy on quantitative versus qualitative methodologies in psychology explored in 2014a in this trilogy and the controversy on nomothetic-ideographic approaches, explored in part III below). Previous research focused primarily on the inferences that can be made about the phenomena under study

given that the empirical structures that can be obtained from them do or do not match particular mathematical properties or statistical theories as demonstrated for "psychometric" methods, amongst others, in Uher (2014b) in this trilogy.

By contrast, the TPS-Paradigm first specifies, on the basis of the philosophical presuppositions that it makes, particular metatheoretical properties that can be conceived for the phenomena under study. Specifically, it considers three metatheoretical properties that generally determine the perceptibility of a given phenomenon by individuals in everyday life and thus, also the possibilities and means for establishing the given phenomenon's perceptibility in research settings (e.g., by using invasive or technical methods). These three metatheoretical properties are conceived on levels of abstraction that are commonly not considered, likely because these properties do not appear to be of primary concern for the research questions pursued in the field, which are commonly far more specific. From these metatheoretical concepts, the TPS-Paradigm derives specific principles for the targeted development of methodologies. Thus, it explores the elementary problem of phenomenon-methodology matching on the basis of only three abstract properties that generally determine the phenomena's accessibility for researchers—and, as a consequence of this, also the accessibility of many further properties that can be perceived in the phenomena under study or can be inferred from them and that are mostly in the focus of research, such as within- and between-individual variations and structures, functional interrelations between events, or processes of change and development. Hence, in this stage of the research process, the TPS-Paradigm considers neither mathematics nor statistics nor any properties of the phenomena under study other than the three metatheoretical ones referring to their temporal and spatial extension.

Nunc-ipsium methods, extroquestive and introquestive methods

The phenomena's *temporal properties* are used to derive and define a first category of methods. Specifically, momentary phenomena can be perceived by individuals and thus can be accessed by researchers only in the particular moments in which their events occur (e.g., vocalisations, heart beats). The brief temporal extension of phenomena under study requires methods that allow for the *real-time recording of momentary events*; the TPS-Paradigm refers to such methods as *nunc-ipsium methods* (from Latin *nunc ipsum* for at this very instant). This criterion is fulfilled in diverse methods that each target at a specific kind of phenomenon (e.g., behaviour, physiology) and that often involve technical means to facilitate the recording of momentary events (e.g., voice recorder; electrocardiograph, ECG).

The phenomena's *spatial properties* (i.e., spatial location in relation to the individuals' body and physicality versus "non-physicality") are used to derive and define two further categories of methods. *Extroquestive methods* (from the Latin *extro* for beyond, outside) are defined as all procedures for studying phenomena that individuals can *directly perceive as being located external to their bodies* and that can therefore *be directly perceived by multiple individuals*—thus, only physical phenomena. Using the same extroquestive ways of exploration, individuals can also directly perceive many physical phenomena of their own bodies both external (e.g., feet) and, under special conditions (e.g., injuries), even internal (e.g., blood). The central point is that physical phenomena of individuals' bodies are directly perceptible or can be made directly perceptible by other individuals as well, both external ones and, under particular conditions, also internal physical phenomena (e.g., coronary arteries by using invasive and technical methods such as open heart surgery or cardiac catheterisation).

Introquestive methods (from the Latin *intro* for in, within), by contrast, are defined as all procedures for studying phenomena that can be *directly perceived only from within the individual him- or herself and that are, in principle, not directly perceptible by any other individual under all possible conditions*—thus, only psychological phenomena. Psychological phenomena (e.g., thoughts) cannot be directly perceived by any other individual (Kant 1786; Locke 1689; Uher 2013, 2014d); they remain generally inaccessible by extroquestive methods, no matter what invasive or technically advanced methods may be used. This entails intricate challenges as the researchers themselves cannot directly perceive the

phenomena under study but have to rely on the studied individuals' externalisations, especially self-reports. Therefore, the TPS-Paradigm refers to all (guided and non-guided) methods of self-observation and self-report as introquestive methods (e.g., self-report questionnaires).

The ending (extro- and intro)-*questive* or *-question* (from the Latin *quaerere* for to seek, ask, enquire) implies that these methods involve all kinds of sensory perception (e.g., visual, acoustic, haptic) as well as some active exploration on the part of the individuals who perceive the phenomena under study. The TPS-Paradigm introduces these terms to denote the particular kinds of methods that are derived from the three metatheoretical properties that it considers. These terms are also introduced to differentiate these specific methods from various concepts of *introspection* and *extrospection*, which are commonly defined and differentiated from one another by focussing on the individual under study (cf., Boring 1953; Butler 2013; James 1890; Locke 1689). But individuals can always perceive and conceive of both external phenomena and their own psychological phenomena; thus they can introspect and extrospect at the same time. Both *perspectives* are always interwoven in individuals' immediate experiential reality—and this applies to both the individuals studied and the researchers studying them (cf. Kant 1781; Wundt 1896). Thus, as methods, introspection and extrospection cannot be clearly differentiated from one another.

The TPS-Paradigm, by contrast, defines introquestive and extroquestive methods and differentiates them from one another on the basis of *a) the particular phenomena under study*, considering that various other phenomena are likely present in the given investigation as well and that all individuals involved can introspect and extrospect at the same time, and of *b) the particular persons who perceive the phenomena under study and who provide first representations of information from their perceptions and conceptions of the phenomena under study in particular external physical phenomena that are used as signs* (e.g., written numerals, spoken words).

Metatheoretical and consent-based commensurability and basic conversion principles

When information is carried over from a particular kind of phenomenon to another kind of phenomenon, this is referred to as *conversion* in the TPS-Paradigm. Conversions of information from psychological phenomena (e.g., perceptions, thoughts), which are imperceptible by other individuals in principle, into external physical phenomena that others can perceive and that are often used as signs (e.g., behaviours, materials like paper, computers), are essential components of every human communication (for details, see Uher 2014d). The conversion of information between different kinds of phenomena is also one of the most elementary processes of data generation in all sciences, in natural and human sciences alike (cf. Wundt 1896). In research on individuals, such conversions of information are particularly important because it is primarily the signs (e.g., lexically encoded variables, numerals) that are considered to be "data" and that are analysed in scientific explorations (e.g., using content analyses, statistical analyses) *in lieu of the actual phenomena under study* (e.g., behaviours, morphology). The phenomena under study in and of themselves are seldom explored directly (i.e., manipulated) as is the case when, for example, bodily tissue is dissected and dyed (i.e., analysed). Consequently, the methodologies used to generate "data" unequivocally determine whether or not a particular kind of phenomenon can be appropriately represented in these "data", thus enabling its scientific exploration (for details, see Uher 2014a, b in this trilogy).

The TPS-Paradigm explores such conversions of information on the basis of the three metatheoretical properties that it considers and of properties that are intersubjectively ascribed to the signs used (e.g., mathematical properties) and that are related to at least one of these three metatheoretical properties (e.g., numerals representing distinct events or frequencies of events of the same kind). Specifically, the particular constellation of forms with regard to all three metatheoretical properties that can be conceived for a given kind of phenomenon establishes its frame of reference. If the same constellation can be conceived for different kinds of phenomena, isomorphisms between their events can be high. Their

frames of reference are then considered to be *completely metatheoretically commensurable* (from the Latin *commensurabilis* for having a common measure). Complete metatheoretical commensurability enables *appropriate* conversions of information between phenomena of different kind, such as between the phenomena under study and the physical phenomena that used as signs in the process of data generation.

By contrast, conversions of information between kinds of phenomena for which different frames of reference can be conceived inevitably entail a loss of information (therefore, the term conversion rather than translation or transcription is used). Significant loss of relevant information, which may be neither obvious nor known a priori, entails that the frame of reference of a particular semiotic system cannot be used to appropriately represent information from the phenomena under study, thus hindering their scientific exploration. This constitutes the elementary problem of *phenomenon-methodology matching* (examples of such mismatches in taxonomic "personality" research are explored in part II below and in Uher 2014b in this trilogy).

The TPS-Paradigm specifies *basic conversion principles* that are relevant for conversions of information between kinds of phenomena that differ from one another with regard to one or even all of the three metatheoretical properties considered. *Conversion Principle 1* states that differences in the phenomena's internality versus externality to the individual's body may constrain conversions of information if, through these conversions, the phenomena under study are altered in and of themselves. This it is a fundamental problem for explorations of psychological phenomena and may also affect explorations of individuals' inner morphology and physiology as explored below. *Conversion Principle 2* denotes that constraints for conversions of information may arise if one or all of the phenomena that are involved are momentary and, in particular, if one or even both of them feature units of varying temporal extension that are therefore identically repeatable only to some extent. *Conversion Principle 3* denotes that differences in the phenomena's physical properties may constrain conversions of information between them if one or even both of the phenomena that are involved feature units of varying spatial extension that are thus identically repeatable only to some extent or if spatial units cannot be conceived at all. Conversion principles 2 and 3 entail challenges in particular for behavioural and psychological research as explored below (for details, see also Uher 2014a in this trilogy)

When, between the frames of reference of different kinds of phenomena, only partial or even no metatheoretical commensurability can be assumed, commensurability must be established on the basis of decisions. These decisions are made by the persons who provide the first conversions of information from their perceptions and conceptions of the phenomena under study in information in other kinds of phenomena that can be used as signs. When these decisions are made explicit and specified in intersubjective agreement, this is referred to as *consent-based commensurability*. Scientific exploration presupposes that information is converted systematically and according to explicitly defined assignment rules (i.e., coding schemes); this is referred to as *encoding* (also coding) in the TPS-Paradigm as in many fields of research as well.

Encoding schemes specify the particular intersubjective agreements that are made in a given study about which particular pieces of information about the phenomena and events under study as perceived and conceived by human individuals (e.g., researchers, observers) can be demarcated and categorised in what ways and how the thus defined units can be represented through which particular signs (e.g., behavioural variables, numerals). These issues of operational definition are well known and frequently discussed in all areas of research—much in contrast to the preceding metatheoretical and methodological steps of data generation, which should therefore not be confused with concepts of operationalism (as explained in Uher 2014a in this trilogy). The TPS-Paradigm extends the previous concepts of operational definition by emphasising that researchers must address in their encoding schemes the particular issues that it specifies in the basic conversion principles for each of the three metatheoretical properties. Explicit definitions and descriptions of the particular

phenomena and events under study are also prerequisite for scientific quantification (Uher 2013, Desiderata 1d-f).

Philosophy-of-science foundations for scientific quantification

Many researchers exploring individuals aim to quantify their particular phenomena of interest. The appropriateness and meaningfulness of quantifications, in particular with regard to psychical phenomena (cf. phenomenon-methodology matching), are intensely debated (cf. the controversies on quantitative versus qualitative methodologies explored in 2014a in this trilogy and on nomothetic versus ideographic approaches, explored in part III below). But clear-cut criteria that researchers can use to decide whether or not particular kinds of phenomena can be quantified at all and what particular methods enable quantifications of which particular kinds of phenomena have been missing so far. In lack of such criteria, numerical data are frequently created somehow or other without specifying how these data are actually generated and what particular phenomena and events they can actually represent (as is the case e.g., in standardised questionnaire methods, see part II below and 2014b in this trilogy).

The set-theoretic and algebraic requirements of scientific quantification

The TPS-Paradigm elaborates philosophy-of-science foundations for *scientific* quantification to provide such criteria. It identifies two elementary requirements on the basis of the three metatheoretical properties that it considers and of established concepts of *set theory* and *algebra* (JCGM 2008). First, researchers must specify the sets of the elements to be quantified in the phenomena under study (i.e., the *set-theoretic requirement* of scientific quantification). These sets of elements must be intersubjectively demarcated, categorised and lexically described in the explicit encoding schemes that researchers establish for their particular study. Second, researchers must directly compare the elements thus-defined with designated fixed physical standards of measurement to express their ratio as a real number (i.e., the *algebraic requirement* of scientific quantification).

The TPS-Paradigm refers to the particular operations and practices that are used to actualise the conversion and the encoding decisions made in empirical studies as *methods of data generation*. Numerical data that fulfil the set-theoretic and algebraic requirements are referred to as *scientific* quantifications—as opposed to (subjective) quantification in which these requirements are not fulfilled (for examples, see Uher 2014b in this trilogy). Importantly, these two requirements must be fulfilled *with regard to the phenomena under study*, not only with regard to the phenomena used as signs given that their frames of reference may be metatheoretically commensurable only partially or not at all. This is not always well considered in research on individuals as the analyses presented in this trilogy show.

Using temporal standards of measurement: The concept of time-relative probabilities

Most frequently used in science are spatial standard units of measurement (e.g., of distance, such as meter). But in explorations of momentary and fluctuating phenomena, comparisons with spatial standards are often complicated. For scientifically quantifying momentary phenomena in which defined events cannot be directly compared with spatial standard units of measurement, such as because the single events vary considerably in their spatial extensions (i.e., behavioural phenomena) or because spatial extensions cannot be assumed at all (i.e., psychical phenomena), the TPS-Paradigm provides a concept in which time is used as the physical standard unit of measurement for enabling scientific quantifications. Specifically, nunc-ipsium methods are used to generate log files of the (non-)occurrences of defined events (e.g., behaviours, externalisations of psychical phenomena) from which quantitative measurements are obtained by accumulating the registered events over repeated occasions. Given the phenomena's momentariness and fluctuations, the measurements thus-obtained can be only probabilistic. These probabilistic measurements are then related to the time periods during which they were recorded to obtain time-

relative probabilities thus enabling *scientific* ratio-scaled quantifications (for details, see Uher 2013, 2014a in this trilogy).

Methodological implications for explorations and scientific quantifications of the various kinds of phenomena studied in individuals: Psychologists' unparalleled scientific challenges

The TPS-Paradigm emphasises that the researchers' opportunities for developing methodologies that are matched to the phenomena under study and appropriate for their exploration and for meeting the set-theoretical and algebraic requirements of scientific quantification are *unequivocally* determined by the three metatheoretical properties that can be conceived for the each given kind of phenomenon. The following explicates the most important methodological implications that are relevant for exploring researchers' theoretical interpretations of data, findings and previous taxonomic "personality" models regarding the phenomena that these represent.

Material physical phenomena (e.g., individuals' body tissue, written documents, interiors of an examination room) are extroquestively accessible, temporally extended and feature rather constant spatial units that are identically repeatable to a considerable extent (e.g., liver cells, printed pages, cupboards). This constellation of properties enables multiple individuals to *perceive one and the same event*. This, in turn, facilitates an intersubjective consent to be reached on how to demarcate and categorise in the phenomena under study the sets of elements to be quantified—as perceived and conceived by human individuals (e.g., different tissue cells conceived of as muscle cells, nerve cells, skin cells). These properties also help researchers to reach intersubjective agreement on explicit encoding schemes specifying how information from the thus-defined elements of the phenomena under study can be systematically converted into the physical phenomena used as signs (e.g., the words denoting "muscle cells", "nerve cells", "skin cells" in English or Latin or any other language). The semiotic systems that are used in science (e.g., lexically encoded variables, numerals) feature the same metatheoretical properties as the material physical phenomena under study (i.e., extroquestively accessible, material⁶ physical, temporally extended); therefore, their frames of reference show complete metatheoretical commensurability with one another, thus enabling appropriate conversions of information from the phenomena studied.

Immaterial physical phenomena do not feature spatial units in and of themselves. In those immaterial physical phenomena that show systematic relations to the material phenomena to which they are bound (e.g., individuals' physiology, electromagnetic radiation, gravity), the sets of elements to be quantified can be intersubjectively demarcated, categorised and defined on the basis of the rather constant spatial units of the material physical phenomena to which they are related (e.g., individuals' morphology, an iron bar).

These properties of both immaterial and material physical phenomena allow for the development of technical methods that automatically convert information from these phenomena into information in semiotic systems without relying on human individuals in this conversion process (e.g., an automated blood gas analyser identifies in blood samples acidity, oxygen and carbon dioxide tension, amongst other substances).

Behavioural phenomena, by contrast, can seldom be explored using automated technologies (as possible e.g., for uniform behavioural movements such as lever presses recorded mechanically). Behavioural phenomena are extroquestively accessible, but they are strictly momentary, which complicates the joint perception of one and the same event by multiple individuals. Behaviours are immaterial physical phenomena and lack spatial units in and of themselves (e.g., sound waves), but units can be identified through the physical matter of the individual's body (e.g., face, chest) and of his or her external surroundings to which they are interrelated (e.g., phonographs that mechanically inscribe sound waves onto

⁶ Digital data can be conceived as immaterial; however, as they can be perceived and used only through the material phenomena to which they are systematically related and bound (e.g., computer screen and other hardware), this specification is irrelevant for the issues explored here.

discs). But, unlike other immaterial physical phenomena, the units that can be identified in this way are identically repeatable only to some extent as their spatial and temporal extensions often vary. For example, individuals can shout in very different ways, such as at different pitch levels, in different volume and with variable intermissions, not to mention the different meanings that they can semiotically convey in their shouting. Given this, what entity can be demarcated and categorised as *one* ($n = 1$) shout? Which particular entities can be considered to be of the same kind, thus as identically repeatable at least to some extent? Even if drawing breath is used to demarcate events of shouting from one another, can brief and long shouts, high-pitched and low-pitched shouts, and softer and louder shouts still be conceived as entities of the same kind? Given these metatheoretical properties of behaviours, there is considerable scope for making decisions about how to convert information from the events perceived into particular physical events of semiotic systems (cf. Uher 2011b). For this reason, behavioural scientists must largely rely on human individuals (e.g., observers) who directly perceive the phenomena and events under study and who provide the primary conversion of information from the phenomena under study into information in semiotic systems. Explicitly defined encoding schemes are therefore essential for achieving conversions of information that are—in the intersubjective perception and conception of multiple human individuals and their socially shared demarcation and lexical encoding—appropriate to represent relevant information from the behavioural phenomena under study (cf. Fassnacht 1982), thus for establishing consent-based commensurability.

Psychical phenomena entail intricacies for scientific explorations that are unparalleled in the sciences (for details, see Uher 2014d). Psychical phenomena are entirely internal and accessible only to the individual him- or herself using introquestion, but imperceptible by other individuals in principle. Whereas the internal material and immaterial physical phenomena with which psychical phenomena are connected (e.g., tissue and electrical potentials of neurons) can be made perceptible for other individuals by using invasive and technical methods (e.g., MRI, EEG), this is not possible for psychical phenomena, which can be conceived only as "non-physical" and thus non-spatial. Given these properties, psychical phenomena do not offer any point of reference that the individual him- or herself could use to demarcate and categorise defined sets of elements. Psychical events can be demarcated only by mere thought, but the mentally demarcated elements cannot be kept isolated for enabling reliable and systematic categorisations (cf. Kant 1786).

However, the specific formations that psychical events may take in any given individual are not important because individuals and their psychical systems, as living systems, are self-organising and thus self-referential to a considerable extent. What is important is their functionality—the *meaning* that they have for the given individual in his or her particular context. Demarcating and categorising these meanings is therefore solely a matter of subjective construction that researchers cannot easily reconstruct for several reasons. Specifically, researchers have to rely on the studied individuals' externalisations (i.e., behaviours, behavioural and material signs) without knowing about how people—each one individually at each given moment—convert information from their internal psychical events into information in external physical ones. These primary conversions of information occur between phenomena with very different properties (internal "non-physical" versus external physical). Isomorphisms between their interrelated events can therefore only be low and their frames of reference can be metatheoretically commensurable only partially or not at all, thus precluding straightforward inferences from individuals' externalisations to their psychical phenomena. This is a crucial point for the metatheories and methodologies that researchers use to define, generate and analyse data (explored in Uher 2014b in this trilogy) and for their interpretations of data and findings thus-obtained (explored in parts II and III below). Further complicating is the fact that adult human individuals primarily externalise their psychical events in language, thus using semiotic representations.

Semiotic representations are important tools for researchers to reconstruct psychical phenomena because semiotic representations comprise assignments of particular meanings to particular behavioural or material signs that are socially shared, also by the researchers if

they are part of the same sociocultural community as the individuals under study (cf. Danziger 1997). However, semiotic systems contain implicit structures in both the external physical phenomena used as signs (e.g., phonetics) and their assignments to particular psychical phenomena (e.g., semantics). These implicit structures and meanings inevitably influence individuals' psychical processes, and thus, also the structures of their memorised psychical resultants both compositional structures and process structures. Therefore, the signs (e.g., lexical terms) that individuals use for externalisations do not reflect the psychical events that they denote in the same ways in which individuals perceive these events at a given moment. Many psychical phenomena can generally not be easily verbalised and, moreover, individuals are consciously aware of only small subsets of their psychical processes (Brower 1949; Freud 1915; Kelly 1955; Komatsu 2012; Lahlou 1996; Larocco 2014; Uher 2013, Uher et al. 2013b; Valsiner 2012; Vygotsky 1934; Westen 1996, 1999; Whorf 1958).

Because researchers can perceive only the signs that individuals use to externalise their psychical events but not the psychical events in and of themselves, the implicit structures, meanings and variations that semiotic representations contain (e.g., language) can interfere twice or even three times in the research process. Inferences can occur (*Conversion Step 1*) in the primary conversion made by the individuals under study who externalise information from their psychical events, thus from the events under study; (*Conversion Step 2*) in the encoding schemes used by the researchers to convert information from the studied individuals' externalisations into information in the signs that are used as variables and data; and (*Conversion Step 3*) in the researchers' interpretations of the analytical results obtained from these data with regard to the psychical phenomena and events to be explored (see parts II and III below).

To establish consent-based commensurability, explicit encoding schemes are required for each of these three conversion steps. But this entails particular challenges that are not always well considered. The explicit formulation of the operational definitions of the variables used in a study (i.e., encoding schemes for Conversion Step 2) is widely recognised as a standard task of any scientific investigation. Explicit encoding schemes are commonly established in studies applying qualitative methods where the individuals under study can freely decide which externalisations to use in their primary conversions of information from their psychical phenomena and where these externalisations are categorised and analysed such as using content analysis (Bauer & Gaskell 2000) but also statistical analyses of textual materials (Lahlou 1996, Neuman 2014). But standardised questionnaire methods with predetermined fixed answer formats, as frequently used in quantitative psychology, do not allow the individuals under study to use the externalisations that they deem most appropriate for encoding information about their psychical events. Rather, the externalisations that they can use are the data variables (i.e., questionnaire items) that are predetermined by the researchers. Thus, Conversion Steps 1 and 2 are inextricably merged. This precludes any opportunities to establish encoding schemes for the two different steps of conversions of information that are involved.

Explicit encoding schemes for Conversion Step 3 specifying the researchers' interpretations of the analytical results thus-obtained with regard to the psychical phenomena and events under study are frequently established. But many researchers do not provide evidence that the meanings that they personally or collectively as researchers reconstruct for the particular questionnaire items statements used as variables do, in fact, correspond to the meanings that the particular individuals under study construct for these particular statements (i.e., signs). Analyses of some widely used standardised "personality" questionnaires demonstrated that these often have *fields of meanings* for the individuals under study and that these fields often diverge from the psychological standard interpretations of these items (Arro 2013; Diriwächter, Valsiner & Sauck 2004; Rosenbaum & Valsiner 2011). This entails risks for all kinds of (anthropo-,) ethno- and ego-centric biases that researchers may (unintentionally) introduce into the generation and analysis of data (for examples in taxonomic research, see Uher 2014b in this trilogy). These biases may also

carry on to the interpretation of results as explored in parts II and III below. To help researchers to become aware of and to minimise potential biases, the individuals under study should ideally be involved at least in some extent without implying that their interpretations need to be accepted by researchers or be directly reflected in scientific theories as is already done in qualitative research (e.g., techniques of communicative validation, Flick 2008; Lahlou 2011).

In studies allowing individuals to freely decide upon the externalisations used, explorations of how the individuals under study may convert information from their psychical events into externalisations (i.e., Conversion Step 1) face particular intricacies. These intricacies arise from the momentariness of psychical phenomena, which actually requires methods of *nunc-ipsium introquestion*. But attention and externalisation inevitably change the course of experiencings and this also hinders the real-time capture of externalisations of more complex experiencings (cf. Conversion Principle 1; Kant 1786; Wundt 1904). In methods of *retro-introquestion*, individuals are therefore asked—as soon as possible after the psychical events to be explored have occurred (e.g., after completion of a specified activity)—to reconstruct the particular experiencings just had (e.g., those that occurred during that activity), thus *ex post facto* and without disturbing the particular experiencings to be explored (Bühler 1907; Rosenbaum & Valsiner 2011). To facilitate reconstructions that are as accurate as possible given the inherent constraints, retro-introquestive methods rely on the activation of episodic memory (Lahlou 2011), and to reduce fallacies of memory (Schacter 1999), they rely on *short-term memory retrieval*. By contrast, *self-report methods* enquiring about individuals' *habitual* experiencings (e.g., some "personality" questionnaires) rely on *long-term memory-based introquestion* through which individuals reconstruct the psychical representations (e.g., self-concepts, attitudes personal narratives) that they have developed from and about patterns in the occurrences of the experiencings that they had in the past.

This complex constellation of challenges for establishing explicit encoding schemes for all three steps of conversions of information that are involved in explorations of psychical phenomena is further complicated by the fact that, unlike other scientists, psychologists explore the very principles and mechanisms by which human individuals perceive and conceive of physical and psychical phenomena, externalise the perceived events, and develop and use semiotic systems for their socially shared representation. At the same time, psychologists themselves are constantly and intuitively doing their own perceiving, constructing, converting and semiotic encoding.

In the face of this bewildering constellation of various kinds of phenomena for which different metatheoretical properties can be conceived and in which information is being converted into phenomena with different frames of reference in explicit ways by the researchers and in implicit intuitive ways by the individuals being studied but also by the researchers studying them, it is all too easy to lose track of what kinds of phenomena are actually represented by particular kinds of encoded variables and data. Interpretations of results and models therefore require careful consideration of the particular kinds of phenomena that the encoded and reduced data and thus the findings obtained from them (can) actually reflect (examples from taxonomic "personality" research are explored in parts II and III below and 2014b in this trilogy; cf. also Gillespie & Zittaun 2010; Køppe 2012; Toomela 2011; Uher 2013; Valsiner 2012).

"Personality": Metatheoretical definition and methodological requirements

By far not all of the many fields of research exploring individuals are concerned with the properties that are specific and unique to single individuals. Explorations of "personality" and "personality differences" require metatheories and methodologies that differ from those that are required for explorations of the properties that are characteristic for most individuals of a given group (e.g., age, gender), community or species. The TPS-Paradigm for Research on Individuals explicitly considers this difference by providing both philosophy-of-science foundations for exploring individuals *in general* and, based thereupon, philosophy-of-science

foundations for exploring "personality", which it metatheoretically conceives of as *individual-specificity*. To be individual-specific, the—often *probabilistic*—occurrences of events must differ between individuals (i.e., are *differential*) in ways that are *temporally stable* for at least some time. Individual patterns that do not differ from those of other individuals and that are not stable at least over some period of time cannot be specific to a given individual (Uher 2011a).

The TPS-Paradigm emphasises that constructs of individual-specificity are developed not only by scientists but also by lay people; such everyday constructs and their encodings in everyday language are explored in lexical "personality" research (as analysed in Uher 2014b in this trilogy). Depending on the particular philosophical presuppositions made, researchers but also lay people differ in which particular kinds of phenomena they construct individual-specificity (e.g., experiencing, "psycho-physiology, behaviour, morphology). By contrast, the TPS-Paradigm refrains from focussing only on particular kinds of phenomena and conceives of "personality" as individual-specific patterns in *all* phenomena of the various kinds explored in individuals (Uher 2013, 2014a). It specifies metatheoretical and methodological principles for each given kind of phenomenon to provide coherent and comprehensive frameworks that researchers can use to explore their particular kinds of phenomena of interest and to establish links between lines of research exploring different kinds of phenomena.

The TPS-Paradigm highlights the metatheoretical fact that individual-specificity *cannot be directly perceived* because it is an abstract idea denoting particular constellations of differential, temporal and often also probabilistic patterns in the occurrences of events in various kinds of phenomena. The TPS-Paradigm also highlights that the identification of individual-specificity requires careful consideration of the particular constellation of the three metatheoretical properties that can be conceived for each given kind of phenomenon. Specifically, for scientifically quantifying momentary phenomena, the occurrences of defined events must be registered repeatedly and accumulated over time (e.g., using the concept of time-relative probabilities). For identifying individual-specificity in all kinds of phenomena, scientific quantifications obtained for individual patterns must be compared between individuals, and the differential patterns thus-identified must be shown to be stable across time periods longer than those in which the measurements were first ascertained and in ways that are considered to be meaningful (e.g., defined by the strength of statistical correlations over specified time periods, Uher 2013, 2014a; Uher et al. 2013a).

This metatheoretical definition of individual-specificity, the philosophy-of-science foundations for phenomenon-methodology matching and for scientific quantifications and the concept of time-relative probabilities allow researchers to explore individual-specificity not only in the *average* occurrences of defined events, but in momentary and fluctuating phenomena also in their *variabilities* and *ranges* within and between individuals and across different time periods, situations and/or different kinds of events (for details see part III below and Uher 2014a in this trilogy; empirical demonstrations are found e.g., in Uher, Addressi & Visalberghi 2013a). These differentiations are particularly important for the interpretation of findings with regard to the particular kinds of variations and structures that they reflect.

The following (part II) applies the above-outlined fundamentals of the TPS-Paradigm to scrutinise the researchers' interpretations of the "personality" taxonomies, constructs and data regarding the phenomena that these (can) represent and their suitability for exploring the mechanisms and processes that govern individual functioning and development.

II) Interpreting "personality" taxonomies: Two major fallacies

In taxonomic "personality" research, as the kind of phenomena being explored, the individual-specific patterns that occur in their variations and structures, and thus the methodologies that are required for empirical explorations are highly complex (for examples, see Uher 2014b in this trilogy), interpretations of the phenomena that are represented by particular data, findings and taxonomic models are prone to two major kinds of fallacies.

Fallacy 1: Interpretations as "traits"—description versus explanation

"Personality" psychologists applying different methodologies to develop taxonomies (for details, see Uher 2014b in this trilogy) offer different interpretations of the phenomena that their particular "personality" models represent. Researchers using lexical physical system approaches rely on the person-descriptive words in the lexica to develop "personality" taxonomies. Metatheoretically speaking, these researchers explore the physical phenomena (i.e., material signs) that the individuals of a given language community have developed and use to externally and physically represent their socially shared representations of individual-specificity. Many prominent lexical "personality" researchers carefully emphasise the fact that language "provides a framework for description, but not necessarily for explanation" and therefore interpret lexically derived taxonomic models as representing "phenotypic personality characteristics" (Saucier & Goldberg 1996, pp. 24-25).

Concepts of genotype versus phenotype: Are they still useful?

Historically, ideas of "phenotype" refer to properties that are external to individuals' intact bodies and thus directly perceptible in everyday life, whereas ideas of "genotype" refer to properties that, under these conditions, cannot be directly perceived and that may causally underlie the perceptible phenomena. But with increasing technological progress for investigations of internal physical phenomena (e.g., physiology), these differentiations become blurred. Researchers explore neurotransmitter systems as *endo-phenotypes* (cf. Uher 2014b in this trilogy) although these internal micro-level phenomena cannot be perceived with the naked eye; their exploration requires technical conversions into other kinds of phenomena that can be directly perceived. The term "genotype" increasingly refers exclusively to the molecules of nucleic acid (e.g., DNA). But information from these micro-level molecules as well can be technically converted into information in other physical phenomena that are perceptible with the naked eye (e.g., crystallographic images of DNA molecules produced by X-ray diffraction; Watson & Crick 1953). Geneticists and epigeneticists are increasingly uncovering mechanisms (e.g., methylation) that can activate and deactivate DNA sequences temporarily or permanently during ontogeny (e.g., x-rays can cause mutations in the molecular structure of DNA). Should such phenomena be labelled "genotypic" or "phenotypic"—what is cause, and what is effect?

Explananda and explanantia: Selective differentiation and erroneous blending

Differentiations of *explananda* (i.e., the phenomena to be explained) from *explanantia* (i.e., the phenomena explaining them) as often made in the natural sciences (Hempel & Oppenheim 1948; Popper 1934) are always a matter of perspective. The TPS-Paradigm emphasises that the status as explanandum or explanans is not inherent to the particular kinds of phenomena being studied. Rather, it is the researchers who decide what particular phenomenon they want to explain and that they therefore put in the focus of their exploration.

The TPS-Paradigm emphasises that researchers of individuals must carefully consider in their explanatory concepts the peculiarities of living organisms (e.g., multi-contextuality, emergence, self-organisation, dialectical processes). Specifically, in the given entity of elements considered, it may always be possible (and even if only conceptually) to isolate single elements from their compositional connections with other elements and to experimentally explore these (conceptually) isolated elements and their interactions with one another (e.g., by defining a particular element as dependent variable and others as independent variables in regression analyses). But these interactions may be different when researchers exclude some elements from the set of elements considered or when they consider additional elements from the particular entity under study (as e.g., in stepwise regression analyses). This is because in the compounded connections found in living organisms, the presence or absence of single elements or of single interrelations between them may fundamentally change the overall interactions of the same set of elements, yielding different properties and functionings (for details, see Uher 2014a in this trilogy; Lewin 1936; Rothschild 1963).

The complex and holistic organisation of living organisms is an irreducible and inextricable matter of fact (Rothschuh 1963). Generating knowledge about individuals therefore entails particular challenges because researchers must make decisions about which particular kinds of phenomena they want to explain in the context of which particular other kinds of phenomena. Researchers must also make decisions about which of the manifold events of the phenomena to be explored they want to study for this purpose and to consider in their explanatory concepts. The rationales and approaches that researchers apply to select the particular phenomena and events to be studied in a given investigation therefore play crucial roles in the explanations they derive. These selection decisions presuppose metatheoretical concepts about the particular kinds of phenomena and the objects of research to be explored and about the particular methodologies that enable researchers to generate appropriate data on them (cf. phenomenon-methodology matching). These decisions also presuppose metatheoretical concepts about how to empirically reduce the information that can be obtained in this way and to derive abstracted information about the phenomena under study that may allow generalisations to be made at least to some extent (cf. Classes of selection approaches; Methods of data generation, and Reduction principles elaborated in Uher 2014b in this trilogy).

These metatheories also influence—both explicitly and implicitly—the researchers' interpretations of the results obtained and the explanations that they derive from such information. The interpretation of lexically derived taxonomic models as reflecting "personality attributes" (e.g., Saucier & Goldberg 1996) adequately considers the fact that, in everyday life, people can directly perceive in other (intact) individuals only phenomena that are located external to their bodies but not internal ones. Thus, people can form their impressions of other individuals only from their perceptions of others' outer morphology, behaviours, artificially modified outer appearances and the physical phenomena of semiotic representations (i.e., behavioural and material signs) that they use. "Personality" could therefore also be defined, in a strict sense, as referring to individual-specificity in only those kinds of phenomena that are directly perceptible by individuals in everyday life conditions (Uher 2013). Many lexical "personality" researchers have also carefully pointed out that everyday language terms need not accurately represent external physical events and that these terms often have semantic fields of meaning (for details, see Uher 2014b in trilogy). These researchers also emphasised the fact that phenomena that are directly perceptible in everyday life conditions need not show one-to-one correspondences to phenomena that are not directly perceptible and therefore highlighted that lexical approaches "lead to data that need explaining, not necessarily to the modes of explanation" (Saucier & Goldberg 1996, pp. 24-25).

In everyday life, however, these basic metatheoretical issues are not well considered. People regularly make inferences—correctly or not—about others' psychical events, even though they cannot perceive these events. People also regularly construct causal explanations of the external phenomena that they can directly perceive in other individuals—most likely using *abductive reasoning*. Abduction is a special form of logical inference that seeks explanation in retrospect—from the facts found in the present, individuals generate hypotheses about possible causes that, necessarily, lie in the past. Therefore, the truth of abductively generated hypotheses is a priori uncertain; abduction is only a very first theoretical step in the processes of investigations that also involve deductive and inductive steps of reasoning (Lahlou 2011; Peirce 1901, CP 7.218; Valsiner 2012; Walach 2013). In line with the peculiarities of abduction, people tend to seek causal explanations for others' external phenomena (e.g., individual behaviours) primarily in the kinds of phenomena that are not directly perceptible in everyday life (e.g., others' psychical or internal physiological phenomena). Popular folk explanations of individual-specificity refer to various ideas about internal causal origins, such as those that are commonly called "personality", "temperament" or "character traits" (Laucken 1974).

The fallacy of misplaced concreteness in ideas about "personality"

From observations of particular events (e.g., behavioural acts), people develop summary descriptions that they lexically encode in abstract single words (e.g., "aggressive", "friendly"). These abstract words enable efficient everyday communication, but are necessarily less specific and accurate than cumbersome detailed descriptions of the single events observed. When abducting possible explanations of observed events, people frequently interpret these conceptually and linguistically abstracted *descriptions* (cf. hypostatic abstraction; Peirce 1902, CP 4.227) as representing concrete properties of the individuals being described (e.g., "dispositions", "traits", "character", "nature"), which is called the *fallacy of misplaced concreteness* (Whitehead 1929a).

These reified properties—because they are mere abstractions—cannot be directly perceived. People therefore assume that these properties must be somehow internal to individuals, and this, in turn, suggests that they could be causes of the events observed, thus serving as *explanations*. Accordingly, people assume that, because an individual *shows* aggressive acts, it *is* aggressive, which explains why it *behaves* aggressively. Such "explanations" are necessarily circular. But despite their inexactitude and intrinsic circularity, abstractions and reifications substantially facilitate and accelerate communication about individuals in everyday life and often have sufficient utility for everyday life purposes (Goldberg 1981; Kelly 1955; Lahlou 1998). Reified abstractions can provide a sense of predictability and control in social interactions that individuals can use to proactively adjust their behaviours, especially given that all individuals of a given community share these ideas and (error prone) ways of everyday reasoning and also assume that they are shared by all (Laucken 1974; Lahlou 1998; Uher 2013, 2014b; Uher et al., 2013b). Thus, the individual development, and even more, the socially shared development of constructs of individual-specificity, derived through mental abstractions of complex constellations in which probabilistic, differential and temporal patterns coincide in the occurrences of events in various kinds of phenomena, is not only an amazing—obviously uniquely human—ability (for details, see Uher et al. 2013b); it also fulfils important functions in people's everyday lives (Goldberg 1981; Lahlou 1998; Uher 2014b).

As members of their particular socio-linguistic communities, all researchers developed such everyday ideas and ways of reasoning in their pre-scientific lives. As scientists, they continue to intuitively use such ideas and ways of reasoning in their everyday lives (Allport 1937; Laucken 1974; Uher 2011a). Language forms such an integral part of conscious human thinking that the fallacy of misplaced concreteness is not easy to recognise, not even for researchers exploring the human mind. This fallacy is therefore widespread in science as well, especially in "trait psychology". Specifically, previously developed human "personality" taxonomies were primarily derived from standardised assessments of person-descriptive statements or single words denoting "lasting personal traits" and "stable traits" in particular (for details, see Uher 2014b in this trilogy; cf. Allport & Odbert 1936; Cattell 1943). But stable personal properties of individuals (i.e., individual-specific properties) refer to differential and temporal patterns that cannot be directly perceived; they can be derived only through abstractions from and comparisons between events, individuals and times. "Personality" descriptors can thus refer only to people's psychically represented and lexically encoded constructs of individual-specificity. It follows that "personality" taxonomies derived from standardised assessments cannot reflect the phenomena in and of themselves that are described by the questionnaire item statements (e.g., individual-specific behaviours) but only summary-descriptions of the everyday ideas, knowledge and beliefs that people have developed *about* the patterns, events and phenomena being described (Uher 2013, 2014b).

Some "personality" psychologists correctly interpret the taxonomic constructs that are statistically derived from standardised assessment data as *descriptive summary constructs of folk ideas* and everyday beliefs about individuals (e.g., McAdams 1992; Westen 1996). By contrast, some lexical "personality" taxonomists, among them proponents of the Big Five Model (e.g., Goldberg 1990; Saucier & Goldberg 1996), theoretically interpret assessment-

derived taxonomic constructs as *descriptive summary constructs of individual-specificity in phenomena that are directly perceptible* in everyday life. This interpretation correctly considers the metatheoretical fact that assessment data can represent only descriptions provided by people but not explanations of the phenomena being described. However, it overlooks the metatheoretical facts that *a*) people cannot directly perceive individual-specificity but can only psychically construct such patterns, and that *b*) people's everyday language terms and thus their assessments often do imply (causal) inferences to and descriptions of possible underlying phenomena that are not directly perceptible in everyday life. Assessment-derived taxonomic models thus describe people's theoretical ideas about and explanations of individual-specificity in various kinds of phenomena both directly perceptible and not perceptible in other individuals (e.g., behaviours, experiencings). But these taxonomies cannot describe individual-specificity in these kinds of phenomena in and of themselves (for examples, see Uher 2014b in this trilogy).

Various kinds of explanatory circularity in "personality" research

Some other "personality" psychologists, in turn, interpret the taxonomic constructs that are statistically derived from assessment data as reflecting *concrete psycho-physical entities, mostly called "traits"*⁷, which are internal to individuals and causally underlie their perceptible properties. Allport (1931), for example, conceived of a "trait of personality" as being "more generalised than a habit" (p. 368) and explicitly referred to it as a "generic term" (1966, p. 3), thus clearly conceiving of "traits" as abstracted summary constructs that are labelled with abstract terms. But at the same time, he interpreted "traits" as having "more than nominal existence" (1931, p. 368) and as referring to individuals' "integrated structure within the skin" and their "real neuropsychic organisation" (1966, p. 2, p. 8). Proponents of the Five Factor Model similarly interpret "traits" as evolved psychical mechanisms that are adaptive, genetically influenced and acted on by natural selection (e.g., Buss 2009; McCrae & Costa 1997; Matthews, Deary & Whiteman 2003).

These causal interpretations of "traits", currently dominant in psychology, are structurally identical to and thus likely derived from the hypostatic abstractions enabled by human language and the patterns of everyday thinking and explaining that build on such abstractions (cf. Neuman, Turney & Cohen 2012). Specifically, "trait" psychologists interpret the structures that are *latent to assessment data* as reflecting structures that are *latent to the particular phenomena that are being lexically described in questionnaire statements* (e.g., individual-specific behaviours). But these interpretations overlook that *a*) lexical symbols denoting individual-specificity (e.g., "personality" descriptors, questionnaire items) cannot directly reflect the phenomena denoted in and of themselves because individual-specificity is not a concrete entity that could be directly perceived (cf. Ogden 1932 on Bentham's theory of fiction). Individual-specificity is only an abstract idea that people construct from properties of individuals that are directly perceptible and from which they abstract particular patterns of their occurrences across events, individuals and times. Latent structures underlying assessment data can reflect at best implicit structures underlying people's constructed ideas

⁷ The term "trait" has very different meanings that require careful differentiation. In biological research on individual differences especially in animals, "trait" primarily denotes a single datum encoding the occurrence of a particular behavioural event in an individual. In psychology, by contrast, the term "trait" denotes a construct of individual-specificity summarising multiple data of occurrences of various kinds of events in many individuals. These terminological differences have caused profound conceptual misunderstandings between biologists and psychologists (Uher 2011a). But also within psychology, connotations of "trait" vary. Some psychologists refer to "traits" as *descriptive summary constructs* denoting individual-specificity in phenomena that are directly perceptible (McAdams 1992; Westen 1996), whereas others refer to "traits" as individual-specificity in phenomena that are *internal to individuals and causally underlie their perceptible properties* (McCrae & Costa 1997; Matthews et al. 2003). To avoid misunderstandings and to refrain from implying a-priori assumptions about causality and stability commonly attributed to "trait"-concepts, some psychologists who interpret taxonomic constructs as descriptive summary constructs therefore refrain from using the term "traits" (e.g., Goldberg 1982; Saucier & Goldberg 1996).

and beliefs about individual-specificity. Hence, there is *b) a fundamental circularity* entailed in interpreting (i.e., *reifying*) the statistically derived summary descriptions of people's everyday ideas as reflecting concrete psycho-physical entities that reside within individuals and that causally explain those directly perceptible phenomena from which people first developed their everyday ideas about individuals (for details, see Uher 2013, 2014b in this trilogy). Abstract descriptions of phenomena cannot serve as causal explanations of the phenomena that are being described (Mischel & Shoda 1994; Uher 2011a).

Like all psychological phenomena, people's everyday beliefs are located in their minds. In this regard, interpretations that describe assessment-derived taxonomic models as representing phenomena inside individuals' bodies are correct. But psychological representations are *outcomes, memorised resultants* from the past cognitive processing of past experiences (e.g., emotions). Reconstructing and retrieving memorised resultants is a psychological processing, an ongoing experiencing, but it is different from the original processing of past experiences that have already ceased to be in and of themselves (see Uher 2014a). Thus, even if particular psychological representations *refer to* individual-specificity in phenomena that are internal to individuals and introspectively accessible (i.e., one's own experiences) or even not accessible (e.g., others' experiences, one's own or others' physiology and inner morphology in everyday life conditions), these psychological representations are *ideas* that people have developed *about* individual-specificity in such phenomena; but they are not nor do they reflect these internal phenomena in and of themselves. Standardised questionnaire methods cannot be used to explore individual-specificity in these internal kinds of phenomena (see also Uher 2014b in this trilogy).

Differentiated psychological representations of particular properties that are perceptible in other individuals (e.g., behaviours, physiognomy) are developed through comparisons with general psychological representations of these properties, which serve as a kind of norm. For example, psychological representations of the behaviours of particular individuals are interpreted subjectively with reference to psychological representations of the behaviours that are commonly shown by the individuals of a given community. For this reason, even small differences in individuals' behaviours can appear as *salient* in people's psychological representations and what is considered salient may be even more pronounced in the socially-shared psychological representations developed by communities of individuals. This suggests that behaviours are more predictive of pertinent psychological representations than people's psychological representations of individual-specific behaviours are predictive of individuals' behaviours (Lahlou 1998).

This important insight challenges the widespread practice in "personality" psychology to use assessments of a person's individual-specific behaviours that often implicitly also comprise causal assumptions (e.g., about underlying psychological phenomena) as independent predictors of that person's behaviours (Lahlou 1998). In fact, this research practice reflects widespread "folk beliefs about intentional causality" derived from reifications of linguistic abstractions that inevitably result in circular explanations (Wagner 1994, p. 243). This practice has also been fostered by the scientific concept of "personality" as a causal determinant of individual behaviour (e.g., Allport 1937, 1966), a concept that is structurally identical to and therefore likely rooted in everyday thinking.

No doubt, psychological representations, once developed, can also causally influence people's behaviours (e.g., everyday ideas about socially accepted conduct). In this specific regard, causal assumptions are correct. But psychological representations cannot be considered to be determinants in terms of *independent predictors* of individual behaviour because they are *derived from* perceptions of individual behaviour. Such causal analyses are intrinsically circular even if the data are generated in different ways and may therefore appear to "originate from independent sources" (e.g., questionnaire assessments versus behavioural observations). Specifically, what people say or have previously said that they or others usually do is not independent from what they or others are observed to do in a given setting because people developed this knowledge from perceptions of their or others' past behaviours (amongst others). Interpretations of psychological phenomena (both experiences

and memorised resultants) as causes and of behavioural phenomena as outcomes ignore the fact that all kinds of phenomena, because they are bound to the individual, develop in tight interplays during ontogeny and therefore cannot be neatly separated into some phenomena that are always causes and others that are always outcomes. Such ideas reflect historical concepts of phenotype versus genotype and of explanandum versus explanans. But these ideas are undermined by people's tendency to blend descriptions of phenomena with their explanation (e.g., by reifying descriptive abstractions as causal entities) as well as by technical advances that enable ever more differentiated explorations of internal physical phenomena.

Standardised questionnaire methods further complicate the theoretical interpretation of empirical results. Specifically, they entail limitations for exploring psychical representations and their relations to other kinds of phenomena because people can report only those psychical representations that are consciously retrievable and lexically encoded. But a lexically encoded psychical representation is a "transformation of a perceptual representation and it is thus from this transformation that the structures inherent to language will produce the final form by imposing their own semiotic constraints"⁸ onto the individual's psychical representations (Lahlou 1998, p. 94).

The different metatheoretical properties that can be conceived for psychical and for physical phenomena preclude one-to-one conversions of information between them, such as between psychical phenomena and lexical (semiotic) externalisations (Uher 2014a, b in this trilogy) or between psychical and physiological phenomena (cf. Zuckerman 1991). Based on erroneous interpretations of the structures that are latent to assessment data as being *directly* associated with structures in individuals' psycho-physiological systems (e.g., neurotransmitter systems; Matthews et al. 2003), some researchers hoped to be able to develop standardised questionnaires as efficient tools for categorising individuals also with regard to their underlying psycho-physiology (cf. Eysenck 1947, 1990). For example, Allport (1966) interpreted "traits" as "cortical, subcortical, or postural dispositions having the capacity to gear or guide specific phasic reactions" (p. 3), but explored these "traits" primarily with standardised questionnaire methods rather than with psycho-physiological methods (e.g., electro-encephalography, EEG).

Allport (1937) passionately advocated for a "psychophysical view of personality" (p. 40) as he wanted to explore how an individual "really is", detached from potentially erroneous social perceptions and judgement (p. 48). He strongly opposed the idea that "personality traits" represent mere social attributes because they inevitably comprise evaluation and judgement. Allport (1966) explicitly considered a "trait" as being "not synonymous with moral or social judgement" (p. 1). But if so, why did he primarily use standardised questionnaires—i.e., people's judgements—to study "traits" although he had specified a broad continuum of 52 very diverse research methods for studying "personality" (Allport 1937, p. 370)? Allport rightfully objected that there "would be no perception at all unless there were something out there to perceive and to judge" (1966, p. 2). But he overlooked the metatheoretical fact that people cannot directly perceive and thus assess "personality" (i.e., individual-specificity) and others' internal phenomena in everyday life and that any perception and judgement is inherently contextualised (Uher 2013) and therefore influenced by the particular judges' anthropocentric (von Uexküll 1909), ethno- and ego-centric perspectives (Uher 2014a in this trilogy).

Hence, in many studies using "personality" questionnaire assessments, the metatheoretical assumptions underlying standardised questionnaire methods match neither the theoretical concepts used nor the theoretical interpretations of the empirical results obtained.

⁸ Translated original: "La représentation linguistique est une transformation d'une représentation perceptive, et c'est lors de cette transformation que les structures propres de la langue vont produire la forme finale en imposant leurs propres contraintes sémiotiques" (Lahlou 1998, p. 94).

Fallacy 2: Interpretations of variations and structures as properties within versus between individuals

Exploring why individuals differ essentially involves explorations of why a given individual shows the particular kinds of differential variations that constitute its individual-specificity. As individual-specificity inherently implies stability over some amount of time, this in turn requires explanations of how the individual-specific patterns function together as a whole within the given individual in the context of his or her particular life circumstances (see Uher 2014a in this trilogy). Allport (1937) considered explorations of "the order that is manifested in the single organism through the inter-relation of its bodily and mental processes" (p. 4) to be elementary tasks of "personality" psychology. His theoretical focus on the single individual is also reflected in his widely cited definition of "personality" as "the *dynamic organization within the individual* of those psychophysical systems that determine his unique adjustments to his environment" (p. 48, italics added).

In exploring individual-specific functioning and development, researchers encounter particularly complex constellations of challenges. First, identifying individual-specificity in the kinds of phenomena that are commonly conceived of as "personality" requires probabilistic, differential and temporal explorations that are tightly interrelated. Importantly, single-case studies fail to disentangle individual-specific patterns from patterns that all individuals of a particular group, community or species show in highly similar ways and that are thus *group-, population- or species-typical*. The frequently expressed idea that results obtained in single case studies in humans describe individual-specific patterns is based on the philosophical presupposition that no human individual is like any other (as, e.g., in Stern's 1911 concept of psychography in which a single individual is explored with regard to many properties). By contrast, the anthropocentrically biased philosophical presupposition that all individuals of a given nonhuman species are alike (e.g., grasshoppers) and that any variation between these individuals reflects mere random variation and measurement error led researchers to interpret single-case findings from this species as reflecting patterns that can be found in all individuals in the same ways but to ignore the idea that individual-specificity may occur in this species as well. Ethno- and ego-centric biases may influence researchers' philosophical presuppositions, metatheories and methodologies in analogous ways (Uher 2011a, 2013, 2014a).

Identifying individual-specificity, as it implies differentiability, inherently *presupposes* between-individual analyses. But importantly, statistical structures *latent to individual-difference data* should not be mistaken for *causal explanations of the single individual* from the sample studied (Block 2010; Giordano 2014; Toomela 2011). This widespread fallacy is structurally related to and likely derived from frequent reifications of abstract descriptions as causal entities of the described (cf. Fallacy 1). In addition, abstract descriptions of *structures of temporally stable differences between individuals* are mistaken for representing *structures within the single individual* that are causally related to the individual differences described.

This fallacy is particularly difficult to recognise because individual-specificity inherently implies individual differences. This fallacy may therefore be derived from erroneous assumptions of structural isomorphisms between phenomena and events studied on different levels of analysis. Such assumptions can mislead researchers to make inferences from structures found on one level (e.g., the population or sample level) to structures on another level (e.g., the individual level) and vice versa. Commonly, those structures that are easier to explore, such as those occurring in directly perceptible phenomena (e.g., behaviours, behavioural and material signs), are used to infer structures that are more difficult to explore, such as those assumed to occur in phenomena that are not directly perceptible (e.g., psychical functioning). This type of fallacy is known to occur in different forms, such as when researchers erroneously project onto each other, for example, patterns of within-individual and between-individual phenomena (Moolenaar 2004; Toomela 2011), patterns of between-individual and between-group phenomena (Thorndike 1939) or patterns of between-individual and between-culture phenomena (Hofstede 2001).

Structurally related fallacies occur when researchers erroneously project patterns of aggregate-level phenomena onto occasion-level phenomena (cf. also Richards 1990), thus turning processes into static entities—i.e., *entifying* them (Valsiner 2000). The exploration of (e.g., microgenetic) *processes* is hindered by the widespread psychological practice of analysing primarily aggregate-level data (Molenaar 2004; van Geert & van Dijk 2002). Hindering is also the practice of encoding perceptible events *a priori* into more abstract data variables (e.g., by asking encoders or judges to mentally aggregate events) rather than encoding events into more specific variables first and introducing traceable abstractions only during data analysis (for details, see the BR_xBS-Approach and Statistical context-based reduction principles elaborated in Uher 2014b in this trilogy).

Further complicating constellations of challenges emerge when researchers aim to explore individual-specificity not only in individual averages, but also in within-individual variability and when they aim to explore individual-specific compositional structures in both averages and variabilities in different kinds of phenomena with regard to their integrated functioning and development in the single individual—i.e., their microgenesis (Aktualgenese) and ontogeny (Ontogenese; Abbey & Diriwächter 2008; Diriwächter & Valsiner 2008; Diriwächter, Valsiner, & Sauck 2004; Valsiner 1998, 2010; Wagoner 2009). Specifically, such explorations require analyses of *temporal regularities and changes* occurring within and especially beyond those time periods in which the individual-specific averages, variabilities and compositional structures were first identified. This means that temporal patterns are to be explored in patterns that are, in and of themselves, defined by certain temporal patterns (Uher 2011a, 2013, 2014a in this trilogy).

For example, individuals may show *individual-specific compositional structures* in the *average* occurrences of particular behaviours as explored in individual-specific situation-behaviour profiles or individual-specific behaviour (response) profiles within a given situation (e.g., individual-specific constellations of particular social contact behaviours that individuals may generally tend to show in interactions with strangers). Moreover, given that within-individual variability often exceeds between-individual variability (Shweder & Sullivan 1990; Uher 2010, 2013), individuals may also show individual-specific compositional patterns in the *variabilities and ranges* in the occurrences of particular events (e.g., behaviours or physiological parameters). In addition to such compositional structures, particular consecutive patterns may be found in the occurrences of events that are specific to some individuals—i.e., *individual-specific process structures* (e.g., individual-specific patterns in the consecutive occurrence of particular social contact behaviours—in both individuals' averages and their variabilities and ranges—over the course of single or repeated encounters during the early phases of relationship development).

Differentiating *between-individual variations in individuals' averages* from *between-individual variations in within-individual variability* is important because within-individual variability may indicate ongoing processes and can reflect mechanisms and processes that may trigger and govern longitudinal change and development (Thelen & Smith 1993; van Geert & van Dijk 2002). For the same reason, differentiating compositional structures from process structures—in both individuals' averages and variabilities (and ranges)—is important, in particular for developmental research. For example, different consecutive patterns may have different meanings for different individuals in particular contexts and may entail different opportunities and consequences for individuals' future behaviour in the same or other contexts and thus for their ontogenetic development (Sato, Wakabayashi, Nameda et al. 2010; Valsiner 1987, 2000).

III) Implications for research on individual-specificity (“personality”)

The above-elaborated philosophy-of-science foundations have important implications for the research methodologies that are required to explore individual-specificity. Specifically, they highlight that the identification of individual-specificity inherently requires analyses of individual differences. But between-individual methodologies are not suited for exploring the functioning and development of a particular individual given that individuals, as living

organisms, are inherently self-organising and therefore self-referential to a considerable extent. But pure within-individual analyses, in turn, cannot be used to identify individual-specificity, which is the core element of all "personality" concepts (Uher 2013).

The TPS-Paradigm emphasises that between-individual methodologies and within-individual methodologies each reveal different kinds of information about individuals and that both kinds of information are important for exploring "personality". It therefore conceives of these methodologies as complementary to one another. Specifically, compositional structures and process structures of a particular phenomenon or organismal subsystem under study cannot be explored by using the same kind of methodology. For example, cell organelles can best be identified by dissecting and dyeing cell components. But the intracellular functioning of these organelles can be explored only in cells that are intact and alive as dissection destroys the interactions that are to be explored.

Moreover, analogous to the *uncertainty principle* (German *Unschärferelation*, literally translated "relation of imprecision") that Heisenberg (1927) established for research problems in quantum physics, the compositional structures and process structures of a particular phenomenon under study can seldom be explored simultaneously with the same precision. For example, fine-grained and comprehensive explorations of the compositional structures of the lexical systems in which communities of individuals encode their beliefs about individual-specificity (e.g., linguistic analyses of the person-descriptive words in a language) may occur at the expense of systematic explorations of how people use the particular lexical encodings in their everyday lives for exploring and reconstructing their pertinent belief systems (e.g., open-ended interviews, ethnological field observations). Both kinds of methodologies (and further ones) are necessary for comprehensively exploring people's lexically encoded beliefs about individual-specificity (examples of such studies are discussed in Uher 2014b in this trilogy). Similarly, nunc-ipsium methods that record in the flow of momentary phenomena the occurrences of defined events over some amount of time produce log files of data that allow for precise explorations of both compositional structures and process structures. But the different analytical methodologies that are therefore required must be applied consecutively and in different steps.

The Hourglass-Shape Methodology for comprehensive taxonomic explorations of individual-specificity

To enable systematic explorations of both individual-specific compositional structures and individual-specific process structures, the TPS-Paradigm provides a three-step methodology—the *Hourglass-Shape Methodology*—in which between-individual methodologies and within-individual methodologies are combined complementarily with one another in three consecutive steps of exploration (see Figure 1).

Methodological Step 1: Between-individual analyses for identifying individual-specific and population-/species-typical compositional structures

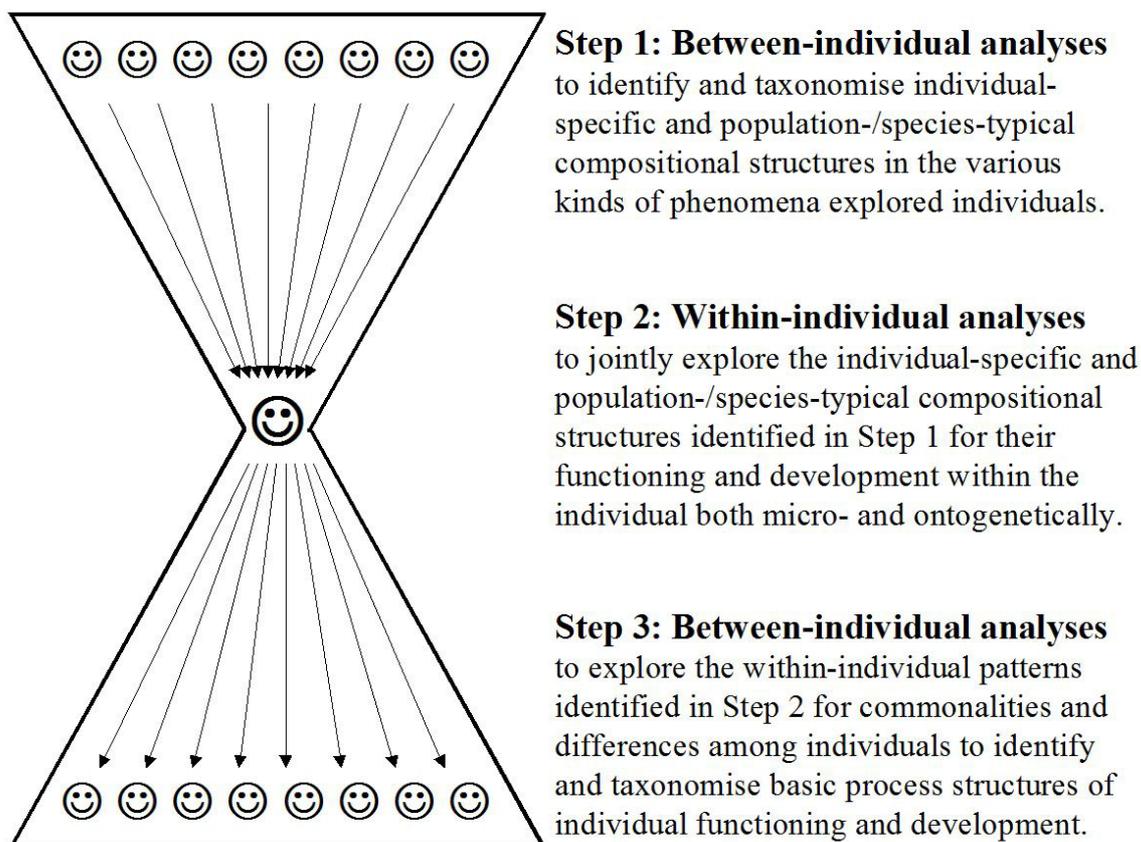
All explorations of "personality" require evidence of individual-specificity in the given phenomena under study. As individual-specificity denotes differential, temporal and (in momentary and fluctuating phenomena) also probabilistic patterns, the first step requires the generation of data on the phenomena and events under study in multiple individuals and on multiple occasions across time. Both differential analyses and temporal analyses are required to evidence possible individual-specific patterns in the compositional structures that can be found in the phenomena and individuals under study; for example, individual-specificity in the time-relative probabilities to show particular social behaviours and to externalise particular kinds of experiencings in encounters with strangers.

These explorations may comprise between-individual analyses of individuals' *averages* and, in momentary and fluctuating phenomena, also of individuals' *within-individual variabilities* across defined periods of time; such as by using the coefficient of variation, which specifies the standard deviation standardised by the mean (for details, see Uher 2013; for an overview of variability coefficients, see van Geert & van Dijk 2002). These between-individual analyses may be based on both variable-oriented approaches and individual-

oriented approaches. *Variable-oriented approaches* are applied by exploring the occurrences of defined events of the phenomena studied across the individuals studied in order to identify particular kinds of individual-specific variations (e.g., gradual or discontinuous between-individual variation) and particular kinds of interrelations between them (e.g., co-variation in the occurrences of different kinds of individual-specific variations). *Individual-oriented approaches* are applied by exploring each single individual's configuration of the variants thus-identified across all defined events to identify individual-specific compositional structures and types of individuals sharing similar compositional structures (for details, see Bergmann & Magnusson 2001; Bergmann & Trost 2006; Stern 1911; Uher 2011a).

Importantly, the identification of individual-specificity *presupposes scientific quantifications* to establish a common basis against which the occurrences of the phenomena and events under study can be compared across individuals and times as well as across different contexts, studies, etc. As specified in the TPS-Paradigm, this requires explicit definition of the sets of elements to be quantified (set-theoretic requirement), such as the elements of the set of behaviours B , of the set of behavioural situations S , of the set of individuals I and of the set of times T considered. It also requires specification of the physical standards of measurement against which the thus-defined elements are directly compared to obtain numerical data (algebraic requirement), such as standards of space (e.g., metric or arm length distance to define close proximity to others) or standards of time using the concept of time-relative probabilities (e.g., average duration of talking per hour, variability in heart beats per minute within an hour; for details, see Uher 2013).

Figure 1 The Hourglass-Shape Methodology for Taxonomising Individual-Specificity: A Three-Step Methodological Approach



Note. The Hourglass-Shape Methodology enables comprehensive taxonomic explorations of individual-specificity by complementarily combining with one another between-individual methodologies and within-individual methodologies in three consecutive steps of exploration in order to obtain different kinds of information about individuals and their individual-specificity. In Step 1), between-individual analyses are used to identify individual-specific and population-/species-typical compositional structures in various kinds of phenomena. In Step 2), within-individual analyses are used to explore how the particular individual-specific *and* population-/species-typical *compositional structures* identified in Step 1 function and develop together in the given individual studied both microgenetically and ontogenetically. In Step 3), between-individual analyses are used to explore the within-individual patterns identified in Step 2 for commonalities and differences across many individuals to identify basic *process structures* of individual functioning and development.

Scientific quantifications are essential for disentangling individual-specificity from patterns that are characteristic of all individuals in a given community (e.g., local region, nation, language or sociocultural community) or species and that are thus *population- or species-typical*. The TPS-Paradigm refrains from presupposing that individual-specificity can be assumed in all kinds of phenomena for all individuals in populations of humans or any other given species; therefore, single-case studies cannot be used for studies of "personality".

Studies using scientific quantification demonstrate the fact that single-case studies cannot reveal which of the individual patterns found can be conceived as individual-specific and which are population- or species-typical. For example, from the finding that a particular person spends a daily average of 7 hours sleeping, 5 hours talking to others and 2 hours eating and washes her hands on average 13 times a day, it cannot be inferred that this person is more "sleepy" than "talkative" or that she is both of these more than she is "hungry". Rather, these patterns may be typical of many people working in offices or as counter attendants on weekdays. The example also shows that different types of measure (e.g., durations, frequencies) result in different magnitudes of the numerical data obtained, thus precluding within-individual comparisons of the occurrences of events even if they are of the same kind of phenomenon (e.g., behaviours). The person in the example cannot be said to be more "cleanly" than "sleepy" just because the numerical score for the frequency of washing hands exceeds the numerical score of hours spend sleeping. (Differences in the magnitudes of occurrences of individual behaviours scientifically quantified in 146 behavioural variables in different types of measure and obtained in 15 behavioural situations were shown in a study on capuchin monkeys and their individual-specific behaviours; Uher et al. 2013a, Supplemental Material).

The imperative requirement of both between-individual comparisons and temporal comparisons in *all* explorations of "personality" may have been obscured by the wide-spread use of methods for generating numerical data that do not fulfil the set-theoretic and algebraic requirements of scientific quantification, such as Q-sort ratings or Likert-scale questionnaire assessments. Such methods preclude scientific quantifications of both occurrences of the phenomena under study and individual-specific patterns in these occurrences (as elaborated in Uher 2014a, b in this trilogy). Moreover, people are known to overestimate between-individual differences because they psychically represent the individual differences that they frequently consider in their everyday lives for differentiating between highly similar individuals in more pronounced ways than can actually be found in the particular phenomena considered (e.g., lengths of human noses), thus attributing salience to minor between-individual variations (Lahlou 1998; Uher et al. 2013b).

Methodological Step 2: Within-individual analyses for exploring individual functioning and development

The TPS-Paradigm emphasises that explorations of individual-specificity on the basis of scientific quantifications also reveal the ways in which individuals are similar to one another to a considerable extent—thus, about patterns that are population- or species-typical. Commonly, such patterns are considered to be objects of research in fields devoted

to the general study of individuals (e.g., general psychology or biology) and are largely ignored in "personality" research.

By contrast, the TPS-Paradigm highlights that population- or species-typical structures are vitally important for exploring individual functioning and development. Specifically, it presupposes that the functioning and development of individuals is largely based on compositional and process structures that are common to all individuals of a given species and that have evolved during the phylogenetic history of that given species. For example in the human immune system, several components that are highly individual-specific (e.g., major histocompatibility complex, MHC) have been identified. But nevertheless, in all human individuals substantial parts of the immune system show highly similar compositional structures (e.g., white blood cells each comprise typical quantities of neutrophils, basophils, eosinophils, lymphocytes, monocytes and macrophages) and these different components show rather identical process structures (e.g., each kind of white blood cell shows a very specific kind of response to specific kinds of infectious organisms and foreign substances). The functioning and development of an individual's immune system could not be explained by considering only his or her particular deviations from the human-specific compositional and process structures of the immune system. Rather, both structures that are species-typical and structures that are individual-specific must be jointly considered.

The TPS-Paradigm highlights that, in present-day's humans, individuals also function and develop on the basis of compositional and process structures that are shared by members of their particular sociocultural community and developed during ontogeny. Specifically, to enable social coordination and joint activity between many individuals, sociocultural communities invest considerable efforts in the co-construction of psychical representations by their individual members, in particular though the development and propagation of semiotic representations (e.g., language) and through instructed learning. These socially shared psychical representations are targeted at the functioning and development of individuals in large and largely anonymous social communities that characterise most of present-day human societies (for details, see Uher 2014d). This is another argument supporting the insight that individual functioning and development cannot be explored on the basis of mere between-individual deviations alone as this is commonly attempted in "personality" psychology.

In Step 2 of the Hourglass-Shape Methodology, the particular compositional structures identified in Step 1—both those shown to be *individual-specific* and those shown to be *population- or species-typical*—are therefore explored *jointly* for their functioning and development in a given individual in particular moments and situations (i.e., microgenetically) as well as over longer periods of time (i.e., ontogenetically). Thus, the between-individual explorations of Step 1 are systematically complemented by within-individual explorations in Step 2; these two kinds of exploration reveal complementary kinds of information that are both necessary for exploring individual-specificity. Specifically, Step 1 first identifies the individual-specific and population- or species-typical compositional structures that are then, in Step 2, further explored for within-individual processes either within the periods of time considered for the primary identification of individual-specificity (e.g., to study microgenetic processes) or over longer periods of time (e.g., to study processes of ontogenetic development).

Importantly, *both* Methodological Steps 1 and 2 involve temporal analyses (except for explorations of phenomena that are temporally more extended such as individuals' morphology, but this presupposes that the phenomena's temporal extension is known a priori and thus involves temporal considerations as well). Temporal analyses are applied in Step 1 to first identify individual-specific patterns and in Step 2 to identify processes, changes and development in the individual-specific patterns identified.

The joint analyses of interactions between elements of the phenomena under study that are individual-specific, and thus conceived of as "personality", with elements that are population- or species-typical, and thus *not* conceived of as "personality", constitute a fundamental difference to previous metatheoretical and methodological approaches in the

field. Previous approaches in which the structures that are relevant for exploring individual functioning and development are determined on the basis of between individual differences (e.g., Thorndike 1911) were rightfully criticised for mistaking between-individual structures for within-individual structures (cf. Fallacy 2). The TPS-Paradigm provides a coherent metatheoretical and methodological framework that enables researchers to avoid this fallacy while simultaneously considering the fact that individual-specificity cannot be identified without between-individual comparisons. The necessity to jointly explore individual-specific and population- or species-typical compositional patterns provides further arguments for the importance of broad-based and comprehensive selection approaches when making decisions about which particular kinds of phenomena and events to explore for individual-specificity (cf. Classes of selection approaches in Uher 2014b in this trilogy).

The exploration of individual functioning and development inevitably requires multiple research programmes that may each focus on different kinds of phenomena, groups of individuals, research questions and perspectives. All the more important therefore is the use of scientific quantification, not only to differentiate individual-specific from population- and species-typical structures, but also to establish direct comparability of findings between different studies and different lines of research. The concept of time-relative probabilities lays the foundations for establishing such comparability also in explorations of phenomena that feature units of variable spatial and temporal extension, such as by standardising the occurrences of defined events in terms of frequencies or durations per hour.

Methodological Step 3: Between-individual analyses for identifying basic process structures of individual functioning and development

The TPS-Paradigm highlights the metatheoretical fact that individual peculiarities can only be identified on the basis of differences between individuals. This also applies to the patterns of individual functioning and development identified in Step 2 that are therefore explored in Step 3 for commonalities and differences across many individuals in order to identify groups of individuals that share basic process structures in their microgenetic and/or ontogenetic development with regard to particular individual-specific variants (e.g., behaviours, morphology, externalised experiencings). Thus, in the Hourglass-Shape Methodology, the within-individual explorations of Step 2 are systematically complemented by between-individual explorations in Step 3.

With these philosophy-of-science elaborations, the TPS-Paradigm demonstrates that neither a science exploring individuals in general nor a science exploring individual peculiarities ("personality") contradicts the scientific dictum *scientia non est individuorum*. The metatheoretical elaborations clearly show that explorations of individual-specificity, because differential patterns are implied, inevitably require comparisons between individuals from which generalisations must be drawn to show whether particular patterns found in a given individual can be conceived as specific to that individual or whether these patterns are typical of many individuals of its kind and thus are not individual-specific. Moreover, because individual-specificity implies temporal and often probabilistic patterns as well, a science of individual peculiarities inherently involves abstractions from unique events. The fact that abstractions and generalisations are elementary to scientific explorations of both individuals and individual-specificity also arises from the peculiarities of living organisms. Specifically, the emergence of new properties, dialectical processes, multi-contextuality, self-organisation and partial self-referentiality, amongst others, contribute to the occurrence of irreversible processes of development that may be historically unique and never repeatable. Exploring such unique and never repeatable events without making any abstractions and generalisations would create information that is always outdated in the very moment in which it is obtained and thus, not applicable to subsequent and future events.

Abstracted information and generalised models are necessarily less detailed than every concrete unique event from which models are derived. But models and theories are structured, orderly and subordinated representations of the multiple and the manifold found in phenomena and events under study (Rothschuh 1963). Developing structural models—of

both compositional structures and process structures—is thus an inherent task of a science concerned with individuals and their individuality.

However, in the various kinds of phenomena in which individual-specificity is explored, between-individual variations of individuals' averages, of their within-individual variabilities, functionings and developmental pathways are so complex that simple regular patterns may not be found or can be conceived only on very high levels of abstraction. But highly abstracted models often have only little explanatory value. Moreover, and importantly, they may also be prone to oversimplifying complexity and to representing only constructed regularity and structure (cf. law of least effort, Royce 1891; Uher 2014a in this trilogy). Thus, researchers of individuals must expect and accept to find some (at times even considerable) degrees of irregularity and non-structuredness in their empirical findings as is the case for researchers in many other disciplines as well (e.g., Caprara 1996).

The status quo of the field: In what kinds of phenomena has individual-specificity been taxonomised so far?

Most taxonomic analyses in "personality" psychology have relied exclusively on between-individual analyses so far and have thus have not yet moved beyond Methodological Step 1 of the Hourglass-Shape Methodology. This may have historical reasons. In separation from a General Psychology exploring the "average individual", the subdiscipline exploring *individual differences* was called *Differential Psychology* (with various meanings; e.g., Stern 1911). When psychologists focused their explorations on the *single individual* and *individual peculiarities*, the subdiscipline became known as "*Personality Psychology*" (e.g., Allport & Vernon 1933; Allport 1937; Stern 1911, 1918, 1935). In the Anglo-American research area, "personality" psychology has largely become established as a summary label for both differential psychology and "personality" psychology, whereas the two disciplines are still differentiated, for example, in German-speaking areas⁹. But "these fields are by no means identical. ... The problem of the *organisation of individual functions* has always eluded differential psychology" (Allport & Vernon 1933, p. viii-ix)—and still does so today. Labelling both disciplines as "personality" psychology hampers the already difficult recognition of the profound fallacies that characterise the field today and that effectively hinder the systematic taxonomic exploration of individual-specificity in all of the various kinds of phenomena, variations and structures commonly conceived of as "personality".

The inability of taxonomies developed only with between-individual methodologies (often called nomothetic methods) to describe or even explain processes of individual functioning and development was criticised often and early on (e.g., Allport 1937; Kelly 1955). This explanatory deficiency promoted the further development of within-individual methods of exploration (often called ideographic methods; e.g., Diriwächter & Valsiner 2008; Salvatore, Gennaro & Valsiner 2013; Lamiell 1998) that, however, cannot identify individual-specificity. In the last decades, the controversy on the utility of nomothetic versus ideographic approaches for exploring individual-specificity and the related controversy on quantitative versus qualitative methods got stuck in specifying and fortifying their oppositions. But defining positions—i.e., specifying thesis and antithesis—is only a first step in the dialectics of development. Science is no exception from this.

The TPS-Paradigm moves these controversies on to a stage of synthesis in which new concepts can emerge by applying the epistemological principle of complementarity originating from quantum physics to elementary problems in research on individuals and individual-specificity. Importantly, complementarity does not mean to compromise between opposing perspectives and to combine elements of categorically different methodologies with one another as is sometimes proposed in the field. Rather, it means to specify the philosophical presuppositions that can be made about the phenomenon under study and to analyse on their basis the appropriateness of the metatheories and methodologies used for its exploration. Following this principle, the TPS-Paradigm elaborated philosophy-of-science

⁹ See, for example, the name of the author's research group at FUB: Comparative Differential and Personality Psychology.

foundations of phenomenon-methodology matching on the basis of the three metatheoretical properties that it conceives for the phenomena explored in individuals. These elaborations demonstrated that the *methodologies are unequivocally determined by the particular constellation of metatheoretical properties* that can be conceived for a given phenomenon under study and that constitute its frame of reference. These elaborations also clarified that both between-individual and within-individual methodologies are required for exploring individual-specificity. But contrary to previous conceptual ideas, each given kind of methodology is appropriate for exploring only particular kinds of phenomena, variations and structures, revealing particular kinds of information that cannot be uncovered by the other kind of methodologies. In the Hourglass-Shape Methodology, between-individual and within-individual methodologies are therefore selectively applied and complementarily combined with one another across three consecutive steps of exploration (cf. Uher 2013, Desiderata 1d-g).

The philosophy-of-science foundations of phenomenon-methodology matching also highlighted some far reaching consequences entailed by the reduction of the broad portfolio of methods that can be used for exploring individuals (cf. the 52 methods specified by Allport 1937, p. 370) to primarily just one single class of methods—standardised questionnaires. Standardised questionnaire methods have allowed psychologists to generate enormous sets of data with a magnitude and efficiency previously unparalleled in the sciences. Data on hundreds of data variables for tens of thousands and even millions of individuals can be generated with hardly any effort on the part of the researchers (and even remotely, e.g., using online tools). Biologists and physicians, by contrast, would have to invest incomparably greater amounts of effort to generate similarly comprehensive data sets on individuals. These enormous psychological data sets have provided the empirical raw materials for important statistical developments, which are basic to and thus essential for many sciences. These data sets also laid the foundations for a plethora of theories and models that could be developed, tested, revised and applied. No doubt, standardised questionnaire methods have been an essential driving force for research in psychology over the last century.

But this accelerated quantitative development in research activities has its downside. To this day, psychologists are unable to explain how the respondents actually generate their answers to standardised scales that researchers recode into numerical data (Rosenbaum & Valsiner 2011). In fact, this question has hardly ever been raised. The metatheoretical analyses presented in this trilogy showed that with a lack of elaborated and explicit conversion and encoding schemes that respondents apply when ticking off their answers to standardised scales, which particular phenomena and kinds of events are actually reflected by these data remain unknown. As the sets of events to be compared are unknown, and as no spatial units can be conceived for psychical phenomena that could be used as designated standards for comparing given events, the “*psycho-metric*” data that are generated with standardised questionnaire methods fail to fulfil the set-theoretic and algebraic requirements of *scientific* quantifications (see Uher 2014a, b in this trilogy).

The widespread practice of using only those sets of questionnaire scales that produce data structures that match the assumptions of pre-existing statistical theories—rather than the properties of the phenomena and events under study (for details, see Uher 2014b)—has resulted in (necessarily) robust taxonomic structures of individual differences that are seemingly replicable across age-groups, nations, many languages, human cultural communities and even species (King & Figueredo 1997; McCrae 2011; McCrae & Costa 1997; Terraciano et al. 2005). These robust findings result not only from the radical matching of the primary data generation to particular statistical theories but also from the fact that, contrary to widespread scientific interpretations, the data thus-created can reflect only one kind of phenomenon—people’s ideas and beliefs about individual-specificity (see below; for details Uher 2014b in this trilogy).

The primary application of standardised questionnaire methods for developing “personality” taxonomies effectively prevented researchers from systematically taxonomising

also those kinds of phenomena that the majority of "personality" and "trait" psychologists commonly intend for their models to reflect—individual-specific behaviours, experiencings and functioning. As a consequence, appropriate taxonomic models describing compositional structures and process structures in individual-specific variants in *all* of the different kinds of phenomena studied as "personality" are still lacking. Investigations in which the complementary Steps 1 and 2 of the Hourglass-Shape Methodology are purposefully matched have to not yet been done.

Step 1 and Step 2 methodologies are no doubt the most difficult steps to undertake, given the enormous effort required to generate (scientifically quantified) data on the kinds of phenomena explored in psychology (for details, see Uher 2014b in this trilogy). Once completed, Step 3 methodologies, as they involve analyses of data generated in Step 2, can be carried out in rather straightforward ways. These explorations will require collective efforts of researchers pursuing different lines of research and across different disciplines (see below).

Everyday psychology and scientific psychology

The insight that popular "personality" taxonomies can represent "only" people's everyday beliefs and psychical representations about such phenomena is for many psychologists a deeply disappointing idea. Why? People develop ideas, beliefs and knowledge about phenomena and events that they encounter in their everyday lives. These psychical representations can help individuals to orient themselves in complex "worlds" and may also help them to predict future events—thus, psychical representations are highly functional for individuals (Lahlou 1998; Uher 2014b). They influence people's perceptions, ideas, activities and decisions and thus their development (Kelly 1955; Larocco 2014; Valsiner 2000). A psychology devoted to exploring individual-specific functioning cannot ignore people's systems of psychical and semiotic representations. Rather, comprehensive investigations of such systems can provide illuminating insights into the ways in which people perceive and conceive of their "worlds" (Laucken 1974). Exploring people's everyday beliefs, psychical representations and knowledge about individual-specificity is therefore an elementary task for both differential psychology and "personality" psychology. Scientists invest considerable efforts in reconstructing and understanding the everyday beliefs of ancient cultural communities, often from not much more than some archaeological artefacts and fragments of old documents. At least an equivalent amount of effort should be devoted to exploring present-day humans' everyday beliefs and knowledge about individual-specificity because they play important roles in all areas of social life (cf. Uher et al. 2013b).

Making everyday psychology an object of research should not be misunderstood as a lay psychological endeavour; much to the contrary, it is a deeply scientific one (Lahlou 1998; Laucken 1974; Moscovici 1961). In fact, as all scientific psychologists are everyday psychologists as well, it is a particularly challenging task to scientifically explore the everyday thinking patterns that are rooted so deeply in our everyday lives while avoiding the common fallacies often contained therein. Most likely as a response to the frequent objection that a discipline that explores individuals cannot be a science, scientific "personality" psychologists often strive to separate their discipline from everyday psychology. This becomes most strikingly apparent in many (especially quantitative) psychologists' reluctance to involve in their research—at least to some degree—the individuals whose psychical phenomena are under study (as done in many qualitative methods; cf. Flick 2008). Instead, scientific psychologists often maintain a tensed and sometimes rather dismissive stance towards lay psychologists. But

"... the psychologist, in spite of his profession, is not a superior judge of people. He should be, but his ascetic and meager formulae derived from 'generalized mind' do not go far in accounting for the peculiar richness and uniqueness of minds that are organic and single" (Allport 1937, p. 5).

At the same time, however, scientific psychologists do not at all hesitate to delegate to lay people the complex task of converting and encoding information from highly complex phenomena and events—some not even directly perceptible (e.g., others' experiencings)—into standardised data. The generation of data by lay psychologists has even become the standard "*psychological*" method on which much of today's research on human "personality" is based. In fact, it is the "outsourcing" of the data generation to the individuals studied that makes the highly efficient creation of the large "psychological" data sets possible at all.

Research on "personality" is intimately connected to people's everyday beliefs, not only because beliefs form part of the set of phenomena commonly conceived of as "personality". Individual-specificity is so central to everyday life that people's interests in pertinent scientific results are particularly strong as becomes apparent in the frequent publications about "personality" in the public media and the popular science and advice literature. Scientific findings that become known to the public may become incorporated—correctly and in biased ways—into people's everyday beliefs and knowledge (e.g., ideas about heritability, terms such as Neuroticism and Extraversion). Thus, everyday knowledge is not independent of scientific knowledge, which entails further intricacies for its exploration (for details, see Uher 2013). But regardless of the origins of everyday ideas and beliefs, researching the structures of people's psychical and semiotic representations and exploring how people use these representational structures in their everyday lives can provide profound insights into how people function as individuals and how they organise their daily lives, individually and as social communities (Laucken 1974; Lahlou 1998; Uher 2014d).

The use of standardised questionnaire methods has effectively prevented researchers from fully exploiting the promising potentials that some selection approaches have for enabling systematic explorations of people's everyday ideas about individual-specificity (e.g., contextualised lexical physical system approaches or the BR_xBS-Approach, described in Uher 2014b in this trilogy). The TPS-Paradigm provides philosophy-of-science foundations and clear-cut criteria that researchers can use to develop and select the methodologies that are matched to their particular phenomena of interest (cf. Uher 2013, Desiderata 1a, 1d-g). These foundations and criteria are aimed at reviving and broadening the portfolio of research methodologies that can and should be complementarily applied to explore individuals and their "personality" and to develop comprehensive taxonomies of different kind.

The diversity of taxonomic models required to explore individual-specificity

For almost a century, many "personality" taxonomists have aimed to develop a "universal theory" or a "general model" of "personality" (Cattell 1965; Giordano 2014; McCrae & Costa 1997; McCrae 2011). Debates over which particular model is most comprehensive and appropriate have therefore been particularly intense (Uher 2014a).

The elaborations presented in this trilogy clearly show that the metatheoretical properties of the different kinds of phenomena, variations and structures conceived of as "personality" require not only very different methodologies, but also *different types of taxonomies*. Hence, contrary to previous assumptions, it should not be the goal of differential psychology and "personality" psychology to develop *one* taxonomic model that best describes (and even explains) individual-specificity in humans of *all* age groups, national, language and cultural communities and that, moreover, covers individual-specificity in *all* kinds of phenomena that are commonly conceived of as "personality". Instead, taxonomic models describing individual-specific *compositional structures* have to be developed for *each* of the various kinds of phenomena studied in individuals (i.e., morphology, physiology, behaviour, experiencings and memorised psychical resultants, semiotic representations, artificially modified outer appearances and contexts; cf. Uher 2013, Desiderata 2, 3, 5, 6, 2014b in this trilogy). In addition, for taxonomising individual-specific variations in momentary and fluctuating phenomena (e.g., behaviours, experiencings), different models may be required to appropriately describe individual-specific compositional structures found in

individuals' *average* occurrences of particular events and in their within-individual *variabilities* and *ranges*.

Further models have to be developed to appropriately represent *basic process structures* in the functioning and development of particular compositional structures both individual-specific and population-/species-typical identified in Step 3 of the Hourglass-Shape Methodology (e.g., micro- or ontogenetic processes in children showing different individual-specific and age-group-typical patterns in social, aggressive and explorative behaviours). Such models may describe interactive processes of individual-specific and population-/species-typical variants within one or even across multiple kinds of phenomena (e.g., between variants in behaviours, experiencings and physiology). Some models may thereby focus on microgenetic processes in particular tasks or situations (e.g., encounters with strangers) or on ontogenetic processes within and across different stages in individuals' lives (Uher 2013, Desiderata 7, 8). Models of these kinds are already developed by other disciplines exploring individuals, such as in psycho-neuro-immunology where patterns of within-individual interactions between the psychical, the nervous and the immune system are studied and modelled both micro- and ontogenetically. Such integrative models have provided new knowledge about the molecular mechanisms that may mediate the still largely unknown interrelations between psychical and physical phenomena. These research approaches have opened up new avenues for exploring the functional relations between "body and mind" and for unravelling fundamental mechanisms and processes underlying individual-specific (pathologic) functioning and development (Ader 2006; Vedhara & Irvine 2005).

For all of these different types of taxonomies, different models have to be developed for particular groups of individuals that may be characterised, for example, by their age, gender, socio-economic class, nationality, language, political system, belief systems, historical era, and so on.

Consequently, rather than developing one general model and a universal theory of "personality", a *multitude of specific models* need to be developed. Ultimately, the central topic of differential psychology and "personality" psychology is the diversity and complexity of individuals. This diversity and complexity must be appropriately represented by the models and theories developed by researchers—but not in the diversity of models meant to represent *the same kinds* of phenomena and events as is currently the case because this reflects only diversity in the researchers' philosophical presuppositions, implicit metatheoretical and methodological assumptions and their anthropo-, ethno- and ego-centric biases. More importantly, the diversity of models must represent diversity *in the phenomena and events that are being represented and in the individuals that are being explored*. The medical and biological sciences adequately consider this and develop a multitude of very specific models to represent micro- and ontogenetic mechanisms in very specific kinds of phenomena and events in particular groups of individuals. Their great advantage, however, is the physicality of their study phenomena, which substantially facilitates the development of explicit encoding schemes for converting information from them into semiotic systems and also allows for the development of automated technologies to carry out some of these conversions. The physicality of these phenomena also facilitates the ability to directly and intersubjectively test the appropriateness of these conversions of information for the purposes of scientific explorations and of the models developed therefrom.

Looking at prominent "personality" taxonomies previously developed in psychology, it becomes apparent that most of the investigatory and taxonomic tasks required for comprehensively exploring the various kinds of phenomena, variations and structures conceived of as "personality" still lay ahead of psychologists. The establishment of standardised questionnaire methods as *the* standard psychological tools has seriously narrowed down the set of investigatory tools that psychologists use. Psychologists should revive the broad portfolio of methods that are available for exploring individuals as outlined, amongst others, by Allport some 80 years ago. In addition, contemporary psychologists can capitalise greatly on the enormous technical advancements recently made. Novel

technologies in physiological research, brain imaging and gene sequencing provide ever more detailed information on individual-specific compositional and process structures in internal physical phenomena. The increasing digitisation and computerisation of everyday life opens up fascinating new avenues for conducting *real-life explorations* of individuals' behaviours, physiological patterns, experiencings, psychical and semiotic representations, outer morphology and artificially modified outer appearances and the everyday situations that people commonly encounter in their lives. Such explorations are enabled by novel recording techniques such as methods of first-person perspective digital ethnography (Lahlou 2011), life logging and reality mining (Dong, Lepri & Pentland 2011), ambulatory monitoring and experience sampling (Fahrenberg & Myrtek, 2001; Fahrenberg, Myrtek, Pawlik, & Perrez 2007; Mehl & Conner 2012) that enable detailed nunc-ipsium and/or retro-intropective recording of events.

Major developments for unravelling the workings of the human mind are to be expected from the further development of microgenetic methods (Abbey & Diriwächter 2008; Diriwächter & Valsiner 2008; Diriwächter et al. 2004; Valsiner 1998, 2000; Wagoner 2009) and their systematic combination with these digital real-life recording techniques. Such pioneering techniques have already been developed in the field of subjective evidence-based ethnography (Lahlou 2011; Lahlou, Nosulenko, & Samoylenko 2009). This new class of methods has been successfully used in various applied fields where accurate exploration of behavioural and psychical processes is of utmost importance, such as for the transmission of complex tacit knowledge in the nuclear industry (Le Bellu, Lahlou & Nosulenko 2010). These methods have also been successfully applied to explore behaviours, psychical processes, and psychical and semiotic representations that individuals are usually not always well aware of in their everyday lives, such as those related to eating and consumption behaviours (Lahlou 2008).

IV) Conclusions from this trilogy of articles: Meta-Desiderata for future research on individuals

The phenomena of life have evolved from the proven functionality of tight interplays between events of different kinds of phenomena (e.g., morphology, physiology, behaviour and the psyche). These interplays are so intricate that they are not directly apparent in conscious thinking. This is not surprising. Conscious thinking, in itself, is not a vital precondition for the development of organismal life; instead, it emerges only on highly complex levels of organismal self-organisation. The ways in which phenomena appear in individuals' perceptions and everyday thinking are targeted towards their functionality for individuals' lives, not towards differentiations and analyses that are accurate in a scientific sense. The different metatheoretical properties that can be conceived for the various kinds of phenomena that are involved in individuals' organismal existence and the complex functional interplays between these different kinds of phenomena are therefore not readily apparent. This entails particular challenges for those individuals who aim to scientifically explore these phenomena. To master these challenges, three meta-desiderata are primary.

Consider the metatheoretical properties that can be conceived for the different kinds of phenomena studied

The TPS-Paradigm that is applied for the analyses presented in this trilogy (Uher 2014a, b) defines and differentiates from one another seven kinds of phenomena explored in individuals: morphology, physiology, behaviour, the psyche, semiotic representations, artificially modified outer appearance and contexts. Their definitions and differentiations are based on three metatheoretical criteria: the phenomena's spatial location in terms of their internality/externality to the physical entity of the individual under study, the phenomena's temporal extension and their physicality versus "non-physicality". The analyses have shown that the diverse constellations of these metatheoretical properties that can be conceived for the different kinds of phenomena entail peculiarities for their accessibility by human

perception in everyday life and for the opportunities to convert information from them into other kinds of phenomena—thus for the methodologies enabling their scientific exploration.

The analyses have also highlighted essential differences between particular kinds of phenomena that are commonly not well differentiated in psychology, such as between experiencing and memorised psychological resultants, between experiencing and behaviours or between behaviours and psychological representations of behaviours. The analyses also have highlighted that, conversely, other kinds of phenomena are often conceived of as being mutually exclusive even though this is not metatheoretically tenable and entails circularity in exploration, such as dualistic conceptions of the individual versus "the environment" or "personality" versus culture (Shweder & Sullivan 1990; Uher 2014a; Valsiner 1987). Interestingly, the insights gained here using purely philosophy-of-science analyses are well in accordance with insights gained in epigenetics that likewise do not support dualistic conceptions of individual versus "environment" (cf. Jablonka & Lamb 2005).

Careful consideration of the metatheoretical properties that the TPS-Paradigm conceives for the various kinds of phenomena under study—in the light of the philosophical presuppositions on which these conceptions are based—is essential to systematically explore these various kinds of phenomena and their interrelations and to become aware of and minimise the various types of biases that are rooted in researchers' everyday abilities to perceive and think.

Match methodologies to the metatheoretical properties conceived for the phenomena under study

The philosophy-of-science analyses presented in this trilogy have also illuminated general principles that underlie any scientific investigation (e.g., phenomenon-methodology matching, scientific quantification, basic conversion principles, metatheoretical commensurability, Uher 2014a; selection approaches, methods of data generation, reduction principles, Uher 2014b). The elaboration and explication of these metatheoretical and methodological principles is important to create knowledge and an understanding of the ways in which particular methodologies and methods enable researchers to investigate particular kinds of phenomena. In fact, careful analysis and consideration of the metatheoretical properties that can be conceived for particular kinds of phenomena may also be used for the targeted development of new methodologies and methods in the future.

With the establishment of standardised questionnaires as *the* standard methods of psychological investigation, the actual meaning of methods as *means* and *tools* of investigation have fallen largely out of sight in psychology. Instead, researchers explore phenomena for the mere sake of their accessibility by particular methods rather than designing the methods according to the particular metatheoretical properties that can be conceived for the phenomena under study (Omi 2012; Toomela 2009, 2011; Westen 1996). The decisive task that lies ahead in psychology is to avoid fitting the generation of data to statistical theories and to generate empirical data that appropriately represent the phenomena and events under study—as they occur in the individuals under study and especially under real-life conditions—*no matter what* distributions and statistical properties these data may show (Uher et al. 2013a, 2013b; Uher 2014b in this trilogy).

No doubt, psychology and especially applied psychology require tools that enable efficient investigations of individuals. But such tools can be developed only *after* the phenomena and events of interest have been comprehensively explored and taxonomised. Only when the properties of the phenomena and events under study and the patterns of their common occurrences in the individuals under study (ideally in real-life settings) are known and systematised can tools that enable efficient investigations be designed. By using standardised questionnaire methods, psychologists have tried to perform these two steps at the same time. As people can directly perceive only the outcomes of their conscious thinking about individual-specificity in the various kinds of phenomena that are commonly constructed and lexically encoded as "personality" but not individual-specificity in these phenomena in and of itself, the generation of data was radically matched to these outcomes

of conscious thinking rather than to the occurrences of individual-specific patterns in the actual phenomena under study.

For the same reasons, the medical statistically-based classification systems of somatic and mental disorders (e.g., International statistical classification of diseases ICD-10, WHO 2010; Diagnostic and statistical manual of mental disorders DSM, APA 2000) and the medical models and theories about the causal mechanisms of disorders were not derived from standardised questionnaires about patients' self-reported symptoms that were designed to match pre-existing statistical theories. Instead, people's diseases were first explored with methods that were designed to investigate the particular morphological, physiological, psychical and/or behavioural phenomena occurring in particular clinical conditions and to explore and model the micro- and/or ontogenetic mechanisms and processes involved in their pathogenesis. Only *thereafter* could researchers develop standard diagnostic tools enabling the efficient investigation and categorisation of individuals, including symptom checklists that could also be completed by patients to obtain a first *overview*. The final diagnosis is still left to the physician's holistic view on the single individual. The most recent revisions of the DSM have shown that the classification systems of the DSM are being continuously and critically debated; many open controversies have still not been solved and further changes and developments will be made in the future. By contrast, many "personality" psychologists consider the taxonomic task of their field to be already completed with the establishment a few taxonomic models (or even just one "universal" taxonomy) and the development of a few corresponding questionnaire scales (McCrae 2011).

Critically question the established standards and one's own explicit and implicit presuppositions time and again

All sciences have developed methods that were later found to be inappropriate for exploring the phenomena of interest. Science is exploration, discovery of the unknown. *Research* includes errors and failures *by definition*. If the success of every development were certain, it would not be *re*-search. Therefore, an essential if not *the* essential element of any kind of research is to make explicit the philosophical presuppositions that are made in a field and the metatheories and methodologies that are therefrom derived and to continuously scrutinise and further develop these elementary thinking tools as they are the very means by which any research is done. As Allport (1937) wrote almost 80 years ago:

"The obscurantist of any generation, says Whitehead [1929b], are in the main those scientists who practice relentlessly the dominant methodology, failing to speculate freely upon its limitations and possibilities for improvement. From this point of view, the present chapter, wholly concerned with the methodology of rating, testing, and experimenting, may be considered partly as a protest against current obscurantism in the scientific study of personality. But with the passage of time, the principles here set forth may in turn become outmoded. If so, they should then be altered or discarded lest they in turn obscure the path of progress" (Allport 1937, p. 462-463).

The transdisciplinary and philosophy-of-science perspectives adopted in this research helped to clarify and provide a better understanding of the origins of many fallacies that are deeply rooted in our everyday thinking and that are also widespread in contemporary research on individuals and their "personality". Recognising and evading these fallacies requires careful consideration of one's own personal beliefs and patterns of thinking, again and again anew. Whatever new insights emerge in science, researchers should check whether the ideas and ways in which they explore phenomena do in fact help them to appropriately represent the phenomena that they aim to explore. This applies in equal measure to all concepts and ideas presented in this trilogy (cf. Uher 2013, *Desideratum 1g*).

Finally, we should always consider that all sciences that we make are always explorations done from the particular perspective and by the particular abilities of the human

primate *Homo sapiens sapiens*. Any explorations that we will do and any scientific theories and models that we develop will always be products of the *human* ways of thinking.

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