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Original Article

Conceiving "personality": Psychologists' challenges and basic fundamentals of the Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals

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Abstract

Scientists exploring individuals, as such scientists are individuals themselves and thus not independent from their objects of research, encounter profound challenges; in particular, high risks for anthropo-, ethno- and ego-centric biases and various fallacies in reasoning. The Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm) aims to tackle these challenges by exploring and making explicit the philosophical presuppositions that are being made and the metatheories and methodologies that are used in the field. This article introduces basic fundamentals of the TPS-Paradigm including the epistemological principle of complementarity and metatheoretical concepts for exploring individuals as living organisms. Centrally, the TPS-Paradigm considers three metatheoretical properties (spatial location in relation to individuals' bodies, temporal extension, and physicality versus "non-physicality") that can be conceived in different forms for various kinds of phenomena explored in individuals (morphology, physiology, behaviour, the psyche, semiotic representations, artificially modified outer appearances and contexts). These properties, as they determine the phenomena's accessibility in everyday life and research, are used to elaborate philosophy-of-science foundations and to derive general methodological implications for the elementary problem of phenomenon-methodology matching and for scientific quantification of the various kinds of phenomena studied. On the basis of these foundations, the article explores the metatheories and methodologies that are used or needed to empirically study each given kind of phenomenon in *individuals in general*. Building on these general implications, the article derives special implications for exploring individuals' "personality", which the TPS-Paradigm conceives of as *individual-specificity* in *all* of the various kinds of phenomena studied in individuals.

Key words:
personality; philosophy-of-science; experience; psyche; behavior; phenomenon-methodology matching; standardised questionnaire methods; contextualized methods; methodology development; scientific quantification.

Content

Why do individuals differ? This central question of everyday life has already been stimulating theoretical developments in philosophy and science for millennia (e.g., works of Hippocrates and Galen; Hirschberger 1980). The question seems simple, but it is not. It addresses an entire complex of very different issues.

First, it enquires about differences between individuals. But *which kinds of phenomena*[1] should be considered—what individuals look like, how they behave, how they feel, what they think, what motivates them or what they disclose about themselves? And *differences of what kind* are important—differences in what is typical for individuals or in how consistent they are across different contexts or differences within one individual from day to day or over longer periods of time? Or should we consider all of this together?

Second, asking why individuals differ is also targeted at exploring *the particular individual*—not just as a random specimen of a given population of individuals, but in terms of his or her uniqueness and peculiarities that differentiate him or her from other individuals, precisely because individuals are often not all the same (cf. Allport 1937). Explorations of differences between individuals are prerequisites for identifying what is specific to a particular individual (Uher 2013). But this fact should not mislead researchers to assume that methodologies suited to explore individual differences are also suited to explore the functioning of the single individual. In fact, they are not (ex explored in this research).

Third, the initial question seeks *explanations*. The particular kinds of explanations naturally depend on the particular kinds of phenomena considered, on whether variations between individuals or within individuals are studied, and whether individuals' constellation of peculiarities at some time or their functioning and development over time are in the focus. Different kinds of phenomena, variations and research perspectives require different kinds of approaches, methods and explanatory concepts. Conversely, particular methodologies and particular kinds of explanations allow only particular kinds of phenomena, variations and research perspectives to be explored (as elaborated in this research).

Hence, addressing the—only at first sight—simple question of why individuals differ involves an entire complex of heterogeneous research questions. Since Hippocrates and other ancient scholars first wrote down their theoretical ideas, a plethora of theoretical and methodological approaches and investigatory methods have been developed. Over the last century, the fields of research exploring individual differences and individual peculiarities—nowadays mostly under the term "personality"[2]—have seen heated controversies between different schools of thought. These controversies have emerged along very different lines of dissent.

Controversies

A core controversy arose on the scientific dictum *scientia non est individuorum*—the idea that a scientific discipline cannot be devoted to studying single cases given that science seeks regularities and lawfulness through abstraction and generalisation from unique events. Many "personality" psychologists therefore pursue *nomothetic* approaches (from the Greek *nomos*, the law) exploring individuals only as examples of prototypical individuals and seeking to identify universal principles. Individuals' characteristics are therefore dissected into narrow phenomena that are accessible to empirical investigation and that are studied using generalised concepts applicable to all individuals in the same way.

But the dissected and generalised individual is "entirely mythical" (Allport 1937, p. 5). "In everyday life, the scientist, like anyone else, deals effectively with his fellow men only by recognizing that their peculiar natures are not adequately represented in his discovery" (p. 4). Other psychologists therefore oppose nomothetic views and pursue *ideographic* approaches *(*from the Greek *ideos*, the peculiar) focussing their explorations on single individuals and seeking to understand the particular individual without destroying its integrity

[1] For a definition of the term *phenomenon* as used here, see the section on the Central Absolute Presuppositions in About Research on Individuals in part II below.

[2] The term "personality" is put in quotation marks in this trilogy to indicate that its definitions vary and that different researchers use this term to refer to different kinds of phenomena and kinds of variation.

(e.g., Lamiell 2003; Toomela & Valsiner 2010; Salvatore, Gennaro & Valsiner 2013). Ideographic concepts therefore converge more strongly with our everyday experiences, thus fulfilling James' (1890) requirement that "conceived systems [of psychological theory] … must at least include the reality of the sensible objects in it" (p. 312). But for many psychologists, this places ideographic approaches close to common sense, which arouses suspicion about their scientificality. This suspicion reflects the tense, at times dismissive attitude held by scientific psychology towards everyday beliefs, despite the tight and important relationships between everyday psychology and scientific psychology (explored in detail in this research, see below; cf. also Uher 2013).

Other controversies have been based on the question of what "personality"—the core concept of contemporary psychology to comprehensively study individuals' peculiarities—actually *is.* Some researchers conceive of "personality" from *external* perspectives by considering the impressions that individuals make upon others (e.g., in terms of their "social stimulus value"; Allport & Odbert 1936; Cattell 1950). Accordingly, "personality" includes social perception, description and judgement (Goldberg 1990; John, Angleitner & Ostendorf 1988); it is conceived as socially attributed and socioculturally constructed (e.g., Kelly 1955). External perspectives are also considered in "personality" concepts that incorporate morphology (e.g., Guildford 1959), constitution (e.g., Eysenck 1947) or behaviour (e.g., Pervin & John 1997; Funder 2004)—often along with thoughts and emotions; thus, with phenomena that occur internal to the individual. Some other perspectives, in turn, approach individuals solely from the *internal* perspective as reflected by Allport's (1937) widely used definition of "personality" as "the dynamic organization within the individual of those psychophysical systems that determine his unique adjustments to his environment" (p. 48). These "psychophysical views" (p. 40) conceive of "personality" as detached from (potentially erroneous) social perception and judgement—as how an individual "really is" (p. 48).

Debates between proponents of internal perspectives on individuals unfold along the lines of research conceiving of "personality" as rather stable inner *structures* versus as *dynamic processes* (Fleeson 2001; Giordano 2014; Mischel & Shoda 1998; Sato, Wakabayashi, Nameda et al., 2010). Still other debates have been based on the particular structure of taxonomic "personality" models in terms of varying numbers and qualities of the particular constructs constituting them (e.g., Ashton & Lee 2005; Cloninger 1986; Costa & McCrae 1992; Goldberg 1990; Tellegen 1993).

Further controversies have occurred over the concepts of *human nature* (the *"images of man";* Fahrenberg 2004; Shotter 1975) underlying different paradigmatic orientations, such as between ideas of humans as driven by subconscious inner urges and conflicts (e.g., Freud 1915), passively responding to environmental conditions (e.g., Skinner 1971, Watson 1913) or actively striving for cognisance (e.g., Kelly 1955), personal growth and fulfilment (e.g., Maslow 1943, Rogers 1959). Related controversies have revolved around causal explanations of why individuals differ: on 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., Hartshorne & May 1928; Mischel 1968) as well as across their lifetime (cf. the *nature-nurture controversy*; e.g., Galton 1874; Loehlin 1992).

Some of these controversies are meanwhile considered to be "solved", such as the person-situation controversy (Fleeson 2004; Funder 2006) and the nature-nurture controversy (Eysenck 1990; Loehlin 1992) by recognising that various viewpoints are important for explaining why individuals differ. Building on this insight, formerly competing theoretical approaches (e.g., biological, psychodynamic-motivational, behavioural-learning, social-cognitive and humanistic approaches) are increasingly integrated as interconnected levels into overarching "personality systems". Such integrative models are aimed at providing "a much more coherent view of the whole functioning individual in the social world" (Mischel, Shoda & Ayduk 2007). Other controversies are still openly burning, such as those between proponents of different taxonomic models (e.g., de Raad & Barelds 2008; McCrae 2011) and especially those between ideographic and nomothetic viewpoints, which are increasingly regaining momentum worldwide (Diriwächter & Valsiner 2008; Lamiell 1998, 2003; Salvatore et al. 2013; Toomela & Valsiner 2010).

The philosophy-of-science perspective

But *what* has been "solved" and "integrated" and *what* is still controversial, respectively? What is actually at the bottom of all these controversies? Exploring these questions requires philosophy-of-science. In contemporary psychology, philosophy-of-science perspectives are rarely considered, however. They are taught in the university curricula only cursorily or not at all anymore. Many of today's psychologists therefore may not be familiar with the basics of philosophy-of-science although it is fundamental to every science and to psychology in very particular ways (Fahrenberg 2013; Kant 1798; Walach 2013; Wundt 1913).

Philosophy-of-science refers to the most general level of scientific knowledge—knowledge about the making of science (Fahrenberg 2013; Toomela 2012; Walach 2013). It requires researchers to make explicit and critically reflect on the philosophical presuppositions that they have made about the nature and properties of the phenomena to be explored and about the fundamental notions by which knowledge about them can be gained (Aristotle 350 BCE; Collingwood 1940). For example, a philosophical presupposition that is widespread in contemporary research is the assumption that, in nature, there are basic structures that follow rational or logical laws and that can thus be described in logically consistent ways and be explored by means of rational or logical analyses. At first glance, this assumption appears to be self-evident, but actually it is not—ultimately, how could this assumption be justified (Walach 2013)?

Philosophical presuppositions are necessary for any given scientific system to function; they are used to derive the metatheories and methodologies that are applied in the given system. These presuppositions can be rationally discussed, but they are not rationally justifiable within the scientific system for which they are formulated. Rather, every scientific system of statements (including mathematical systems) has to rely on basic rational structures from outside the given system that is built upon them (cf. incompleteness theorem; Gödel 1931); therefore, these presuppositions are also called *absolute presuppositions* (Collingwood 1940). It follows that no scientific theory can ultimately be proven or validated as it is always possible that the absolute presuppositions on which a given scientific system (e.g., a paradigm, theory) is built may turn out to be untenable. It is also possible that competing and contradicting scientific systems are constructed on the basis of alternative absolute presuppositions (Fahrenberg 2013; Walach 2013).

Absolute presuppositions vary across scientific communities, socio-political systems and historical times, such as the different images of human nature. Rational decisions on the ultimate validity and correctness of these presuppositions about human nature cannot be made within the research traditions for which they are formulated and in which they direct and guide the development of theories and research practices. Thus, although each given research tradition in psychology comprises a coherent set of statements, theories and methods, the different traditions are contradictory and sometimes even irreconcilable with one another because they are based on different absolute presuppositions (Fahrenberg 2013; Walach 2013). Therefore, it is essential to make explicit the philosophical presuppositions on which a given scientific system is built in order to analyse from a meta-perspective the theories, approaches and methods that are applied within this system—that is, to critically reflect on the metatheories and methodologies used in a given field.

Metatheories are basic assumptions that determine how researchers reduce real phenomena to scientific phenomena and hence, what they consider to be facts in their field and how the thus-defined facts can be theoretically analysed and interpreted. Metatheories also refer to the implicit and explicit beliefs, theoretical ideas and basic assumptions that researchers make about their objects of research and to the questions that they ask about these objects (Althusser & Balibar 1970; Køppe 2012; Toomela 2011; Wagoner 2009; Weber 1949).

Methodology refers to the ways (i.e., approaches) in which researchers tackle the questions that they asked about their objects of research and to the techniques and research practices (i.e., methods) that they therefore use. Hence, metatheory and methodology are

closely interrelated and intertwined with one another and with the philosophical presuppositions from which they were derived (Sprung & Sprung 1984; Uher 2013).

In a nutshell, the philosophy-of-science perspective is vital for explicating the philosophical and metatheoretical assumptions underlying different theories and models that are created in a field and to unravel the methodological core principles governing the processes of their creation. Knowledge about the making of science is important to better understand and to place in context previous lines of research and their interrelations and to show ways of developing novel lines of research that allow for the exploration of the questions that previous lines have left unanswered (Valsiner 2012; Wolpert 1992).

This trilogy of articles

This trilogy of articles employs the *Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals* (briefly referred to as *TPS-Paradigm*) to explore the basic metatheories and methodologies that are applied in research on individuals using the example of taxonomic "personality" research.

The present first article (Uher 2014a) begins (part I) by pinpointing profound challenges that more strongly affect scientists studying individuals than those of other disciplines. It then (part II) introduces some basic fundamentals of the TPS-Paradigm focussing on important absolute presuppositions that are made about the different kinds of phenomena that are frequently explored in research on individuals and on "personality". Philosophy-of-science foundations are elaborated and general methodological implications are derived for the elementary problem of phenomenon-methodology matching and for the scientific quantifications of the various kinds of phenomena explored in individuals. From these considerations, the article derives (part III) implications for the metatheories and methodologies that are used and/or needed to investigate these kinds of phenomena in *individuals in general*. Building on these general implications, the article elaborates (part IV) special implications for exploring *individual-specificity* in these various kinds of phenomena, which is conceived of as "personality" in the TPS-Paradigm.

On the basis of the insights gained about the special implications for exploring *individual-specificity*, the second article (Uher 2014b) explores the metatheoretical assumptions underlying the three methodological steps that are employed by psychologists for developing comprehensive "personality" taxonomies by focussing on some currently popular models. Centrally, this article scrutinises the specific methodologies and methods that are used in the field regarding their abilities to capture the particular kinds of phenomena towards which they are targeted and thereby reveals frequent mismatches. It shows that some explorations that are theoretically well justified have been empirically implemented only insufficiently so far. It identifies additional methodologies that can be derived from the same and alternative theories and that are required to fully explore the targeted phenomena but have yet to be tackled. The analyses also reveal that the primary use of standardised questionnaires has significantly hampered the empirical investigation of individual-specificity in most kinds of phenomena explored in individuals, in particular in experiencing[3] and behaviour. The article presents both established and novel methodologies that appropriately meet the properties of the particular phenomena under study.

The third article (Uher 2014c) explores the theoretical interpretations of the thus-obtained models, constructs and data regarding the phenomena that these represent and their utility to explain *individual-specific* peculiarities, functioning and development. The philosophy-of-science analyses reveal widespread erroneous assumptions, rooted in everyday thinking, about the abilities of previous methodologies—and thus of the "personality" taxonomies derived from their application—to appropriately represent individual-specificity in targeted phenomena. Independent of the well-known differences in the absolute presuppositions about human nature, which will not be further considered in this trilogy, the analyses show that some of the controversies in the field are still openly burning

[3] For the term *experiencing,* see the section on the Phenomena of the Psyche in part III below.

because, given the methodologies applied, many research traditions actually do not study the particular kinds of phenomena to which they are targeted. Corroborating concerns that have been voiced repeatedly, the article shows that previous taxonomic "personality" models have largely failed to empirically capture individual-specific experiencing, behaviour, functioning and development, psychology's core objects of research. Novel methodologies that may have the power to fill the identified gaps are presented together with potential ways in which methodologies and different kinds of taxonomies that have yet to be developed could be devised in future research. The article closes the trilogy by outlining three meta-desiderata for future research on individuals and their "personality".

I) Psychologists' challenges

Scientific psychologists face profound challenges. How can a science explore and understand a subject matter from which the makers of this science are themselves inseparable (cf. Durkheim 1919)? How can scientists explore the functionings, abilities and limitations of the human mind when they are equipped with nothing but such a mind (cf. Stent 1969)? How can scientists explore the uniqueness of individuals' thoughts, feelings and behaviours when each is a uniquely thinking, feeling and behaving individual him- or herself? How can there be "objectivity" in such a science?

Anthropo-, ethno- and ego-centric biases of type I and type II

Any scientific endeavours are bound to the minds that make them (Valsiner 1998, 2000, 2012). Therefore, science is inseparable from its makers' particular perspectives on their objects of research given their own positions in the world—as humans, members of particular communities and individuals.

Primarily, scientists are human beings with human-specific abilities, perspectives (cf. von Uexküll 1909) and interests that determine—and limit—their possibilities for exploring the world (cf. Nagel 1974). This entails risks for two types of systematic errors (Uher 2009). *Anthropo-centric biases type I* occur when scientists focus on only those phenomena that their species-specific abilities enable them to perceive or to conceive of, that are human-like (anthropo-morphic) or that scientists perceive as such in the sense of false positive biases.

> "There is a universal tendency among mankind to conceive all beings like themselves, and to transfer to every object, those qualities, with which they are familiarly acquainted, and of which they are intimately conscious. We find human faces in the moon, armies in the clouds; and by a natural propensity, if not corrected by experience and reflection, ascribe malice or good-will to every thing that hurts or pleases us" (Hume 1757; Section 3).

Anthropo-centric biases type II, by contrast, occur when scientists ignore those phenomena that they cannot readily perceive or conceive of, that are not human-like or that scientists do not perceive as such in the sense of false negative biases (cf. Nagel 1974).

These types of biases can affect scientists' work on two levels (Uher 2009). On the *metatheoretical level*, these biases can influence the ways in which scientists demarcate scientific phenomena from real phenomena, what elements of these phenomena they consider to be facts, which objects of research they decide to study in these scientific phenomena, how they conceive of these objects and what questions they ask about these objects. On the *methodological level*, both types of biases can influence the techniques and practices that scientists use to convert and to encode perceived qualitative and quantitative properties of the selected elements into categorised data, and to analyse and interpret these data (see part II below and Uher 2014b, c in this trilogy).

Scientific history is full of examples of both types of anthropo-centric biases. For example, beliefs about human uniqueness have long prevented researchers from even considering the idea that individual-specific behaviours could also be found in many other species as well (Uher 2011a), even in human's closest relatives (Goodall 1986; Uher 2011b;

Yerkes 1939). Now, anthropo-centrism seems largely overcome on metatheoretical levels as shown by the significant increase of pertinent publications (cf. Freeman & Gosling 2010). But it still persists on methodological levels as evidenced by many animal researchers' ignorance of the fact that "personality" ratings provided by human observers bias reports of nonhuman individual behaviours in often anthropomorphic ways (as demonstrated by Uher, Werner & Gosselt 2013a). Having an outsider's perspective on other species need not make scientists any more "objective" in exploring them. Distance from the objects of research is a double-edged sword.

Analogous types of *ethno-centric biases* occur on both levels when scientists (unintentionally) approach their objects of research based on their own position in their social world (Faucheux 1976; Teo & Febbraro 2003). Their particular gender (Pellegrini 2011), stage of ontogenetic development (Baldwin 1906), educational and sociocultural background (Adam & Hanna 2012; Geertz 1988), scientific discipline and school of thought (Kuhn 1976), nationality within the same scientific discipline (Russel 1927, pp. 29-30), political attitude (Cattell 1950, p.11), religion and worldview (Weber 1930, 1946), language (Deutscher 2010) and historical time (Fischer 1970; Gergen 1973)—to name just a few—make them insiders to particular communities and outsiders to others. "Insiders and outsiders exhibit different biases" (Lahlou 2011, p. 621).

Ego-centric biases analogously occur, likewise in both types and on both levels, when the scientists' own personal standpoints influence their scientific explorations (cf. Fahrenberg 2013; Weber 1949).

> "No matter how objective and simple it may appear, all description relies on personal interpretation—the author's own point of view. It is well-known that man projects his personality onto everything, and that when he believes he is photographing the outside world he is often observing and depicting himself" (Ramón y Cajal 1897/1999, p. 63).

Hence, the diversity of scientific theories on the same object of research also reflects the diversity of personal views amongst their creators (Fahrenberg 2004, 2013; Geertz 1988). Such biases are known in all sciences; inevitably, they are particularly pronounced in those sciences dealing with human individuals, such as psychiatry (Rosenhahn 1973), behavioural research (Devereux 1967), education (Rosenthal & Jacobson 1968)—and "personality" psychology (Uher 2013).

But these biases are not just evils that are to be avoided. They are also important sources of inspiration for scientists (Teo & Febbraro 2003). New knowledge is created from experiences and knowledge made previously (Valsiner 2012). Anthropo-, ethno- and ego-centric biases, because they are rooted in the researchers' own experiences and knowledge from everyday life, are important sources of information and anchor points. Where else should students and scientists start from at the beginning of their scientific endeavours if not from what they already know as human, social and individual beings (Uher 2011a; Valsiner 2000)? Scientists are never free of such biases (see Uher 2014b, c in this trilogy, 2013; Wolpert 1992).

The scientists' mind and its human peculiarities

A plethora of further biases, illusions, errors and fallacies in reasoning is known to occur in human minds (e.g., Wolpert 1992). For researchers exploring why individuals differ, the *law of least effort* (Royce 1891) is particularly important.

> "This law, that our consciousness constantly tends to the minimum of complexity and to the maximum of definiteness, is of great importance for all our knowledge. … If things have more than a certain complexity, not only will our limited powers of attention forbid us to unravel this complexity, but we shall strongly desire to believe the things actually much simpler than they are. … And thus, in every case where we

> fancy ourselves sure of a simple law of Nature, we must remember that a good deal of the fancied simplicity may be due in the given case not to Nature, but to the ineradicable prejudice of our own minds in favor of regularity and simplicity" (Royce 1891, pp. 316-317).

Abstracting from complex phenomena entails further challenges. The semiotic tools of language allow human minds to convert—on a mere conceptual level—perceived properties (e.g., black) into hypothetical objects (e.g., blackness; called *hypostatic abstraction*; Peirce 1902, CP 4.227). This purely *semiotic reification* makes perceived qualities conceptually independent of their embodied perception (Neuman, Turney & Cohen, 2012). This allows for the mental handling of abstract ideas and for their further abstraction (e.g., colour). Yet, in everyday life—and also in science—these linguistically created hypothetical objects are often treated erroneously as concrete objects. This so-called *fallacy of misplaced concreteness* (Whitehead 1929) may lead to wrong conclusions about the perceived objects; such like not recognising that colours, in and of themselves, are not properties inherent to objects or light itself, but are created only in individuals' minds (Newton 1704).

The fallacy of misplaced concreteness is particularly difficult to recognise for human psychologists as they explore the minds of individuals who are of their own kind. Psychologists therefore tend to mistake the *concepts* that they have developed *in their own minds about the individuals being studied* with those *phenomena in the minds of the individuals being studied* that they try to explore (for details, see Uher 2013; cf. James 1890a, 1890b). For animal psychologists, recognising this difference is typically much easier but not self-evident either (Uher et al. 2013a). It is awareness and careful consideration of the possible involvement of biases in the processes of knowledge creation that should differentiate everyday psychologists from scientific psychologists. This also affects concepts of "objectivity".

The scientists' beliefs and "objectivity" in research on individuals

Scientists can never step outside of their being as human individuals. Crucially, because every scientist is an individual him- or herself, scientific knowledge systems about individuals, especially about human individuals, cannot be established on the basis of absolute presuppositions that are independent of the objects of research as is possible, for example, in physics, chemistry and most areas of biology. The absolute presuppositions that scientists make about their study phenomena and objects of research are inevitably influenced by their own (explicit and implicit) beliefs that they have developed from the inherently anthropo-, ethno- and ego-centric experiences that they have had so far (Fahrenberg 2013; Uher 2011a; Walach 2013).

It follows that, in research on individuals, the "objective" can be only *intersubjective*. The intersubjective need not—and actually cannot—be universal because consensus can be reached only if the absolute presuppositions are shared. Particular scientific communities therefore oppose others who make other absolute presuppositions and therefore follow other metatheories and methodologies and that, as a consequence thereof, reach other consensuses. Intersubjectivity is always bound to the individuals who establish it; intersubjectivity can therefore never be absolute (Weber 1949). For this reason, it is essential to make explicit the absolute presuppositions on which a given line of research is based because this enables critical reflection on both the absolute presuppositions that are made and the metatheories and methodologies that are developed according to the same or similar presuppositions (Uher 2013, Desiderata 1g, 1f).

Keeping in mind such challenges of researchers who study individuals, the next part of this article (part II) introduces some central fundamentals of the Transdisciplinary Philosophy-of-Science Paradigm that is applied in this trilogy to explore central controversies in research on individuals using the example of taxonomic "personality" research (Uher 2014b, c).

II) The Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm): Relevant foundations

The philosophical, metatheoretical and methodological foundations of the TPS-Paradigm are based on various lines of thought from both philosophy and psychology. Space constraints in this trilogy limit the degree to which these historical precursors and other related lines of research can be referred to and to which meaningful links exist can be further explored and developed. Likewise, the article can introduce only those fundamentals that are directly relevant for the analyses presented in this trilogy with regard to taxonomic "personality" research. More comprehensive accounts of the TPS-Paradigm, its links to other lines of thought and more details and background information on the issues outlined here and on other related issues can be found in Uher (2014d, in prep.[4]).

Nature and aim

A *paradigm* is a philosophical and metatheoretical framework that is based on (explicit and/or implicit) absolute presuppositions and that comprises theories and models that are interrelated with one another and with the methodologies that are needed to empirically support the theoretical ideas conceived. As the TPS-Paradigm provides interlinked philosophical, metatheoretical and methodological frameworks, it is called a paradigm.

Commonly, however, a paradigm is understood as a framework that is shared by the scientists of a given scientific community across some period of time. Scientific communities are *thought collectives* (Denkkollektive; Fleck 1935) that make decisions about which phenomena are considered to be facts and objects of research, what research questions are acceptable to ask and which practices used to demarcate, categorise, explore and explain these facts and objects of research are considered to be scientific and valid (Kuhn 1962; Walach 2013). In contrast to other research paradigms, the TPS-Paradigm systematically integrates and further develops metatheoretical and theoretical concepts and pertinent methodologies that were developed in various scientific disciplines—i.e., that originated from different established paradigms—and it complements and expands these concepts and methodologies by developing novel ones (Uher 2011a; 2013, 2014a, b, c). Therefore, it is called a *transdisciplinary paradigm*.

The vital element of the TPS-Paradigm is the explicit formulation of the absolute presuppositions on which it is built and of the metatheories and methodologies that are developed on the basis of these absolute presuppositions. For this reason, the TPS-Paradigm is referred to as a *philosophy-of-science paradigm*. All sciences are explicitly or implicitly based on a philosophy-of-science. In this regard, this labelling is not meant to indicate any unique feature that is not shared by any other paradigm. Rather, the name indicates that a great emphasis is placed on making explicit as comprehensively as possible the absolute presuppositions, metatheories and methodologies on which it and other lines of research are based. When made explicit, this enables the critical reflection, discussion and further development of previously established theories, models and research practices and the derivation of ideas for novel lines of research. This is seldom done in research on individuals (Fahrenberg 2013; Omi 2012; Schwarz 2014; Toomela 2011; Uher 2013; Walach 2013; Weber 1949; Westen 1996).

The following explicates the most basic absolute presuppositions on which the TPS-Paradigm is based. Some researchers may agree with these presuppositions, others may not or only partially. Those who do not agree, must develop and use metatheories and methodologies other than the ones that are analysed in this trilogy (Uher 2014b, c), thus precluding direct comparisons. These explications are made both to reveal possible differences in the absolute presuppositions that are made in the field and, in particular, to enable comparisons and controversial discussions between different lines of research that

[4] To appear in the *Annals of Theoretical Psychology, vols. 12, 13*.

are based on the *same* or similar absolute presuppositions as made in the TPS-Paradigm (Uher 2013, Desiderata 1f, 1g).

Central absolute presuppositions about research on individuals

Science is made by human individuals. Therefore, all scientific endeavours are inextricably entwined with and thus limited by human's perceptual and conceptual abilities. This statement does not imply denial of a reality that exists independently of human perception and conception and in which humans have evolved as a species over millions of years (Uher 2014d). It merely emphasises that the sole access that we can gain to this reality is enabled by these human abilities and that, consequently, these abilities limit our possibilities for getting to know about, explore and understand this reality.

In the TPS-Paradigm, the term *phenomenon* therefore denotes anything that is perceptible (or can be made perceptible, e.g., through technical means) by the human senses and/or that can be conceived of by the human mind. This differs from various historical thought traditions in which phenomena are conceived of as mere sensory perceptions that are differentiated from non-sensual concepts (sometimes called noumena); for example, in the philosophies of Plato (Hirschberger 1980) or Kant (1781).

The elementary system of three metatheoretical properties to differentiate various kinds of phenomena

The TPS-Paradigm conceives of and differentiates various kinds of phenomena that are at the centre of research on individuals and that—all or just some of them—are often incorporated into definitions of "personality" (for details, see Uher 2013). Between them, the paradigm conceives of basic kinds and of composite kinds of phenomena.

Basic kinds of phenomena are inseparable from the material entity of the individual being studied. The TPS-Paradigm differentiates from one another four basic kinds of phenomena; these are the phenomena of morphology, physiology, behaviour, and the psyche. Importantly, inseparability here refers to the material entity of the healthy and physically intact individual. Inner organs and blood can be separated from the individual's body only by using invasive methods, thus infringing on his or her physical integrity; physical phenomena removed from the individual's body no longer belong to his or her material entity. The phenomena of the psyche, in and of themselves, cannot be isolated from the individual's body, no matter what invasive and advanced technical methods may be used; psychical[5] phenomena can be separated from individual's body only conceptually (e.g., on the basis of the metatheoretical properties that can be conceived for them as done in the TPS-Paradigm, see part III below).

Composite kinds of phenomena, by contrast, each comprise several different kinds of phenomena, among them at least one basic kind of phenomenon that is thus inseparable (in the sense stated) from the individual under study. Therefore, composite kinds of phenomena are more heterogeneous and complex than each of the basic kinds of phenomena in and of itself. The TPS-Paradigm conceives of the phenomena of semiotic representations, artificially modified outer appearance and contexts ("environments") as composite kinds of phenomena.

These various kinds of phenomena, which will be defined and outlined below (part III; cf. Uher 2013, Desideratum 1a), are differentiated from one another on the basis of an elementary system of three metatheoretical properties that the TPS-Paradigm conceives for them. Each given kind of phenomenon can always be characterised by the particular form that it takes with regard to each of these properties—specifically, by a *particular constellation* of forms that can be conceived for them with regard to these three properties. Their specific and different constellations entail that each given kind of phenomenon has its own *frame of reference* that is applicable to the other kinds of phenomena only to some degree or not at all. The particular constellation in each given kind of phenomenon *unequivocally* determines

[5] For the term psychical, see the section on the Phenomena of the Psyche in part III below.

the methodologies required for empirical investigations; it also has important implications for pertinent metatheories. Insufficient differentiations especially between the basic kinds of phenomena may therefore entail mismatches with the methodologies that are applied for their investigation (explored in this part below and in Uher 2014b, c in this trilogy).

Importantly, the absolute presuppositions made about the three metatheoretical properties and the distinctions between various kinds of phenomena are made in the TPS-Paradigm *only* with regard to research on individuals; no claims for universal applicability or utility are made. Rather, other fields of research may hold other perspectives on these phenomena and may also focus on other kinds of phenomena and other metatheoretical properties that are not considered in this research.

What metatheoretical properties are conceived? Given that all science is made by humans, the TPS-Paradigm concentrates on three properties that can be conceived for the phenomena explored in individuals and that determine whether and how these phenomena can be perceived by individuals in everyday life. Thus, these properties also determine the phenomena's accessibility by researchers (or other individuals such as observers) and the ways in which researchers can make some phenomena that are not directly perceptible in everyday life accessible in research settings by using invasive and technical methods (see Uher 2014c in this trilogy).

In line with this, the considerations of the TPS-Paradigm are always made in the spatial and temporal dimensions of everyday life experiences (i.e., spatial dimensions comparable to human bodies and the temporal dimensions of the international time standard) rather than in the dimensions that can be conceived at the molecular or atomic level or for outer space as explored, for example, in chemistry and quantum physics or astronomy. But in contrast to this and importantly, the three metatheoretical properties are conceived on levels of abstraction that are commonly not considered in either everyday life or science likely because these properties do not appear to be of primary concern for the often more specific research questions pursued in the field. However, as these abstract properties generally determine the phenomena's accessibility for researchers, they 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.

1. Metatheoretical property: Physical location of the phenomena under study in relation to the material entity of the individual under study

In the TPS-Paradigm, the concept of *internality and/or externality* differs in several important ways from previous concepts in research on individuals and on "personality". First, with regard to this metatheoretical property, individuals, in and of themselves, are conceived of as material physical entities with particular spatial (and temporal) extensions rather than as subjectively, psychologically and/or socially constructed entities. Thus, the *term individual refers to a concrete material entity* that can be directly perceived in everyday life and that can be demarcated from its surroundings and from other individuals on the basis of the boundaries of its spatial extension. Second, the TPS-Paradigm considers externality and/or internality in terms of *the spatial location of the particular phenomena under study* (e.g., individuals' morphology, behaviours) in relation to the material entity of the individual under study. Third, based upon the thus-defined physical location of the phenomena under study, the TPS-Paradigm considers their *perceptibility by individuals primarily in everyday life conditions and only secondarily in experimental research conditions*.

The absolute presuppositions made about the spatial location of the phenomena under study reflect the everyday experience that individuals cannot directly perceive phenomena that are internal to other healthy and fully intact individuals' bodies (e.g., inner organs, ligaments, bones, brain), because these phenomena are located "underneath the skin" (with a very few exceptions under particular conditions, e.g., teeth). In everyday life, individuals can directly perceive only phenomena that are external to others' bodies (e.g., faces, clothes, books,

buildings). Physicians and scientists can make individuals' internal phenomena perceptible (directly or indirectly) by using invasive and technical methods (e.g., surgery, x-ray). But this is possible only for internal phenomena that are physical (see below). Thus, in contrast to other lines of research, the TPS-Paradigm does not refer externality and/or internality to a particular theoretical focus that researchers may adopt in their explorations of individuals or to the perspectives that individuals can generally take with regard to themselves or others (cf. Kant 1781; Wundt 1896). Instead, this metatheoretical property is solely conceived of as the spatial location of the phenomena under study defined in relation to the (intact) material physical entities of the individuals under study because this location, together with the other two properties considered (see next) unequivocally determines the ways in which these phenomena can be perceived by individuals in everyday life conditions and accessed using research methods (explored below in parts III and IV, also in Uher 2014d).

2. Metatheoretical property: Temporal extension of the phenomena under study

The TPS-Paradigm considers the temporal extension of the phenomena under study because researchers, observers and the individuals under study can directly perceive only those particular phenomena that are *present in the moments of investigation*. Some phenomena are temporally more extended (e.g., individuals' morphology, buildings), which facilitates the perception of events. But other phenomena are momentary and fluctuating (e.g., behaviours, thoughts). Fluctuation and emphemerality entail particular challenges for the methodologies that are required for empirical investigations (explored in parts II and III below).

3. Metatheoretical property: Physicality versus "non-physicality"

In the TPS-Paradigm, the conception of *material physical* properties denotes that, in the phenomena under study, *spatial units* that are rather constant and identically repeatable to a considerable extent can be conceived (e.g., molecules, cells, organs, body parts, texts, buildings). By contrast, *immaterial physical* phenomena do not feature spatial units, in and of themselves (e.g., heat, behaviours). But spatial units can be defined through the material physical phenomena of individuals' bodies and of other external phenomena to which immaterial physical phenomena are systematically related. Importantly, the *terms physicality and physical* used in the TPS-Paradigm refer to the science of physics rather than to corporality, which cannot be conceived for immaterial physical phenomena.

"Non-physicality", by contrast, denotes the immaterial properties of the phenomena of the psyche that, in and of themselves, lack not only spatial units that are identically repeatable, at least to some degree—in fact, spatial dimensions can generally not be conceived for these phenomena (Kant 1798)—but that also lack systematic relations to the material and immaterial physical phenomena to which they are related (e.g., brain matter and physiology; Fahrenberg 2008a, 2013; Wundt 1894). Importantly, in the TPS-Paradigm, the term "non-physicality" does not indicate a simple contrast to the physicality of other kinds of phenomena; for this reason, the term is put in quotation marks. The term is meant to denote properties that are often associated with the terms psychical[6] or mental in the philosophical literature but less frequently in the psychological literature. Therefore, these terms are not used to refer to the metatheoretical properties that this paradigm denotes as "non-physical". Moreover, in the TPS-Paradigm, psychical phenomena are considered not only with regard to their "non-physicality" but also with regard to the forms that they take with regard to the two other metatheoretical properties conceived, specifically their internality and temporal extension.

[6] For explanations of this term, see the section on the Phenomena of the Psyche in part III below.

The differentiation of physical and "non-physical" properties made in the TPS-Paradigm refers to one of the most fundamental problems of philosophical and psychological research: the psycho-physical, body-mind or brain-mind problem (e.g., Fahrenberg 1979, 1992, 2013; Rothschuh 1963; Walach 2013), which is called the *psyche-physicality problem* in this paradigm, in accordance with its particular terminology. The pertinent assumptions underlying the TPS-Paradigm are based directly on the principle of complementarity.

The epistemological principle of complementarity

Bohr (1937) introduced the principle of complementarity as a solution for the wave-particle dilemma in physical research on the nature of light and as a key term in quantum mechanics. Bohr highlighted the impossibility to sharply distinguish between the properties of a physical object under study and the inevitable interactions of these properties with other physical objects serving as measurement instruments. He stated that, by using different methods, apparently incompatible sorts of information can be obtained about the properties of the same physical object. These different properties cannot be brought into connection with each other by using deterministic concepts of causality. But for an exhaustive account of the findings obtained, all properties are equally essential and may therefore be regarded as complementary. In addition, as Heisenberg (1927) showed for physical phenomena, complementary properties of an object of research cannot be simultaneously determined with the same precision (i.e,. *Unschärferelation*, literally meaning "relation of imprecision", but mostly translated as *uncertainty principle*).

Bohr (1937) explicitly indicated that the principle of complementarity, which helped to clarify elementary research problems in physics, could prove to be an epistemological principle that is also helpful in the life sciences. Biology and psychology explore many phenomena exhibiting pairs of complementary properties that are mutually exclusive and maximally incompatible with one another but that are both related to the same object of research and both necessary for its sufficient description. Bohr explicitly suggested that the principle of complementarity also seems suited for viewing the old psyche-physicality problem in a new light in which it adopts a metaphysically neutral position, i.e., without presuppositions of monism or dualism. Rather, by analysing the presuppositions and the appropriateness of the conceptual structures involved, by conceiving frames of reference that are categorically different, self-contained, mutually complementing and both essential for exploring the particular phenomenon under study, the principle of complementarity is aimed at avoiding futile controversies and at rejecting methodological compromises while implying no limitations to the application of particular methods to describe and explore particular objects of research (Bohr 1937; Fahrenberg 2008a, 2013).

In line with this Bohrian principle of complementarity and its various applications in philosophical and psychological research (e.g., Fahrenberg 1979, 1992, 2013; Hoche 2008; Walach 2013; Wundt 1894), the TPS-Paradigm emphasises the necessity of adequately considering—both theoretically and methodologically—the particular constellations of the forms that can be conceived for the different kinds of phenomena with regard to the three metatheoretical properties that it considers and that establish different frames of reference. Specifically, physical and "non-physical" properties each necessitate different ways of describing and exploring using different research approaches and methods that each rely on different criteria to establish the reliability and validity of the results that can be obtained with them.

Similarly, the different forms that the phenomena can take with regard to the two other metatheoretical properties inherently require different methodologies. But in contrast to physicality versus "non-physicality", these forms are not mutually exclusive and therefore not complementary in the Bohrian sense. Rather, physical location relative to the individuals' bodies and temporal extension can each be conceived of as gradual dimensions representing the same kind of property. Furthermore, the three metatheoretical properties in and of themselves are not complementary to each other. By contrast, each given kind of phenomenon is *always* characterised by a particular *constellation of forms with regard to all*

three properties; for example, behaviours are phenomena that are external, bound to the present moment and physical.

Individuals as living organisms: Metatheoretical concepts of exploration

Bohr (1937) furthermore pointed out that "those essential features of living organisms which are brought to light only under circumstances which exclude an exact account of their atomic constituents are laws of a nature which stands in a complementary relationship to those with which we are concerned in physics and chemistry" (p. 297). Hence, the epistemological principle of complementarity seems also useful for explorations on levels of abstraction as different as specific physical phenomena and complex living organisms.

Living organisms can be conceived of as *systems* composed of sets of interrelated elements forming a complex organised whole (von Bertalanffy 1973). Living systems are complex at every level of their hierarchical structure of organisation; interrelated elements at one level are compounded into *new* elements at the next higher level (e.g., atoms, molecules, organelles, cells, organs, individuals). In living organisms, series of systems can be conceived that are organised within a greater array of even more complex systems (Caprara 1996). At each hierarchical level, complex organismal systems function as organised *wholes* and their properties cannot be deduced from knowledge of the constituting elements and their interrelations. When such systems are assembled from their elements, new characteristics of the whole emerge, and these could not have been predicted from knowledge of their constituents and the interrelations between them (e.g., Hartmann 1964; Mayr 1988; Rothschuh 1963; Wundt 1863).

This so-called *principle of emergence* reveals that the identification of lower-level constituting elements of living organisms, in and of itself, does not explain how they function together as a whole; the whole has different properties, structures and functionings (e.g., Diriwächter & Valsiner 2008; Köhler 1969; Koffka 1935; Pauli 1927; Toomela 2012; von Bertalanffy 1937; Vygotsky & Luria 1930). Therefore, assumptions of *isomorphisms* between interrelated elements at different levels (in all directions) can be very misleading (Mayr 1988; Wolpert 1992). The TPS-Paradigm emphasises that, when the different levels involve phenomena for which different metatheoretical properties and thus different frames of reference can be conceived, then isomorphisms can only be low, if not completely absent.

Moreover, from the same set of interrelated elements, different properties and functionalities can emerge in different systemic contexts. As series of systems are nested within each other, the elements at any one level in the organism's hierarchical organisation can be conceived of as *multi-contextual* (cf. Bronfenbrenner 1979; Morris 1988). Thus, multiple properties and functionalities may be identified for the same set of interrelated elements depending on which particular ones out of all their contextual phenomena are being considered (for definitions of context, situations, etc., see part III below). In addition, elements at any one level can be in continuous interaction with one another as well as with other elements both internal and external to the organism while being constantly integrated as wholes on different systemic levels (cf. Lewin 1936).

Therefore, only some of the interrelations between elements within and across the entities considered can be conceived of as *causal connections* (Kausalzusammenhänge) of which various kinds can be conceived (e.g., simple and complex connections, successive and simultaneous causal chains). In addition, *compositional connections* (Gefügezusammenhänge) must be conceived in which the interacting elements co-occur in coordinated ways and match and cooperate with one another such that the entirety of their joint interactions results in complexes of higher organisation and unity (Rothschuh 1963). The presence or absence of single elements or single interrelations between them may fundamentally change the overall interactions of the same set of elements in the same set of contextual phenomena considered (Lewin 1936; Rothschuh 1963). For example, the various enzymes that are involved in the metabolic processes taking place in the mouth, stomach and intestines are matched with one another and with the pH-values that first enable their enzymatic activity. All these elements co-occur in a fine-tuned spatial and temporal proximity and a specific order in different parts of the digestive system. A lack or insufficiency of just

one single enzyme or a slight change in the pH-value of one specific systemic part (e.g., the stomach) can dramatically change the overall process and the outcomes (Rothschuh 1963).

The principle of emergence and the occurrence of compositional connections between elements of any given entity entail that most empirical knowledge concerns *processes* (Rothschuh 1963). The development of living systems is often characterised by *dialectical processes* in which interactions between elements can result in lasting changes of the interacting elements in and of themselves as well as of their interrelations. These peculiarities entail that living organisms undergo in their microgenetic, ontogenetic and phylogenetic development continuous and irreversible processes that may also be historically unique and never repeatable (Baldwin 1896; Caprara 1996; Li 2003; Morris 1988; Prigogine 1996; Riegel 1979; Valsiner 2000).

Given these developmental processes, living organisms can also be conceived of as *self-organising systems* that are therefore *self-referential* to a considerable extent (Fahrenberg 2013; Luisi 2003; Varela, Maturana & Uribe 1974). In addition, individual organisms can be conceived of as open systems that exchange with their surroundings (i.e., *dissipative systems*; Prigogine 1996; von Bertalanffy 1949). Dissipative systems (both non-living and living) develop non-linear system dynamics. Even if their constituting elements are comprehensively known, in the course of development, bifurcations may occur, at which point the directions of a system's future development become unpredictable. This may further contribute to the irreversibility of the processes occurring in the microgenetic, ontogenetic and phylogenetic development of living organisms (Prigogine 1996; cf. also Li 2003; Lewis & Granic 2000; Vallacher & Nowak 1994).

Living organisms are entities and unities with regard to both their self-identity in the flow of time and the results of the organised interactions between their compositional elements. In the course of the organism's exchange of matter and energy with its external surroundings and the organisms' ontogenetic changes, it remains the same organised system and can thus be conceived of as a spatio-temporal entity (raumzeitliche Ganzheit, Raumzeitgestalt; Rothschuh 1963). The living organism is an orderly arrangement of elements that interact with one another in complex ways. Therefore, this entity is more than the sum of its elements. Their interactions cannot be comprehensively explored in experimentally isolated elements because the elements, by interacting with one another, produce new, previously non-existing properties.

Given that series of systems are nested within each other forming ever more complex entities, a complete knowledge of all conditions and all elements that determine the processes of a living organism is impossible. Generating knowledge about living organisms therefore requires observation and data collection from which information is abstracted and generalised to some extent in order to identify regularities and structures that are represented in (preliminary) structural models and theories. Abstract 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 the immediately given events (Rothschuh 1963). Developing structural (taxonomic) models is thus an inherent task of every science—including a science concerned with individuals and their "personality" (as explored in detail in Uher 2014c in this trilogy).

Considering the peculiarities of living organisms (e.g., systemic multi-layered organisation, principle of emergence, multi-contextuality, self-organisation, dialectical and irreversible processes of development, holism), the TPS-Paradigm highlights the necessity to distinguish explorations of *compositional structures* of the given entity considered from explorations of how the compositional elements identified may interact with one another, what new entities and functionings may emerge from their interactions and how the different systemic structures may develop over time—thus from explorations of *process structures.* Importantly, these different kinds of structures are mutually complementing in that explorations of processes presuppose that the elements interacting with one another are identified and knowledge of the processes, in turn, enables the identification of higher-order entities of interacting elements forming new wholes with new properties. Thus, both kinds of

structural perspectives are necessary to comprehensively explore individuals and are therefore conceived as complementary to one another in the TPS-Paradigm (as elaborated in Uher 2014c in this trilogy).

Research on individuals thus requires methodologies that allow for identifying and tracing elements and dynamic, multi-causal, multi-directional, multi-contextual, multi-linear and non-linear interrelations within and across different levels of hierarchical organisation (e.g., Bohr 1937; Caprara 1996; Diriwächter & Valsiner 2008; Lewis & Granic 2000; Nagel 1961; Prigogine 1996; Salvatore et al. 2010; Vallacher & Nowak 1994; Valsiner, Molenaar, Chaudhary & Lyra 2009; Wallaczek 2000). The TPS-Paradigm emphasises that researching the various kinds of phenomena explored in individuals inherently requires a plurality of methodological approaches that are complementary in the Bohrian sense in that they each reveal different kinds of information about living organisms that are altogether necessary to comprehensively explore individuals (for details, see also Uher 2014b, c in this trilogy; Fahrenberg 2013; Walach 2013; Wundt 1866, 1919).

Importantly, however, complementarity does not mean to compromise between opposing perspectives and to combine elements of incompatible methodologies with one another. Instead, the TPS-Paradigm emphasises that particular methodologies allow for exploring only particular kinds of phenomena and only particular properties. On the basis of the particular philosophical presuppositions that it makes about research on individuals, the paradigm elaborates general methodological implications and basic principles for the elementary problem of how research methodologies can be matched to the particular phenomena under study (cf. Uher 2013, Desiderata 1a, 1d).

General methodological implications: Basic issues of phenomenon-methodology matching

Central to any science is the development of methodologies that enable researchers to explore the particular phenomena under study. This is referred to as the elementary problem of *phenomenon-methodology matching* in the TPS-Paradigm.

Many controversies have arisen with regard to this matching problem. In psychological research on individuals, a prominent debate has existed on the suitability of quantitative versus qualitative methodologies. (Another related debate about between-individual versus within-individual methodologies is explored in Uher 2014c in this trilogy.) Much of the quantitative-qualitative debate is centred on concepts of quantity and measurement, experimental manipulation for identifying the magnitude of relations between events (e.g., additive structures), operationalism, kinds of measurement scales and issues of validity, reliability and measurement error, amongst others (for a recent debate, see e.g., Michell 1997, 2003, 2011; Rosenbaum & Valsiner 2011; Saint-Mont 2012; Toomela 2008, 2011; Trendler 2009). The basic issues in this debate are focused 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 (Saint-Mont 2012). But only little attention is devoted to the ways in which the empirical data that are being analysed are actually generated in the first place (methodologies for data generation and data analysis used in "personality" research are explored in Uher 2014b in this trilogy).

Specifically, under which particular conditions can a particular methodology actually be considered to be "appropriate" and under which ones should it be considered a "serious problem" (as is often voiced in this debate)? What specifically does "appropriate" mean? What constitutes a "serious problem"? Hence, what specific properties must a methodology have, and what should it enable researchers to do? Pertinent debates are surprisingly vague about answering these fundamental questions.

The TPS-Paradigm elaborates clear-cut criteria that researchers can use to decide whether and how a particular methodology can be matched to a particular phenomenon under study. On the basis of the philosophical presuppositions that it makes about research on individuals and the three metatheoretical properties that it conceives for the phenomena

explored in individuals and on the levels of abstraction that it considers, the TPS-Paradigm derives general methodological implications and elaborates philosophy-of-science foundations of scientific quantification. These implications and foundations are used to explore the elementary problem of phenomenon-methodology matching and to derive methodological principles that specify how this matching can be established by researchers (cf. Uher 2013, Desiderata 1a, 1d, 1f). Importantly, 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.

A first set of methodological implications is derived from the elementary system comprised of the three metatheoretical properties. The TPS-Paradigm specifies that, because these particular properties determine the phenomena's perceptibility by individuals—and thus their accessibility by researchers, the methods used for explorations must be matched to the particular forms that can be conceived for a given phenomenon under study with regard to each of these properties.

Matching temporal properties: Nunc-ipsum methods

A first category of methods is derived and defined on the basis of the temporal properties of the phenomena under study—i.e., their temporal extension. Phenomena of only brief temporal extension can be perceived by individuals and can thus be recorded by observers or researchers only in the moments in which their events occur (e.g., the height of a jump) or sometimes directly after their occurrence (e.g., the end of an individual's walk). The brief temporal extension of phenomena under study requires methods that allow for the *real-time recording of ephemeral events*; the TPS-Paradigm defines such methods as *nunc-ipsum methods*, derived from the Latin *nunc ipsum* meaning at this very instant. This category of methods comprises a heterogeneous set of methods that each target at a specific kind of phenomenon (e.g., behaviour, physiology) and that often involve various technical means that facilitate the recording of momentary events (e.g., video-based recording of behaviours, electric devices to record evoked neural potentials such as EEG).

Importantly, in any given research setting, events of all of the various kinds of phenomena that can be explored in individuals may be present in the particular moments of investigation. Nunc-ipsum methods are defined with regard to *only those particular kinds of phenomena at which they are targeted*, regardless of the fact that other kinds of phenomena are likely present all that time as well. For example, physical phenomena (e.g., individuals' ankles, Egyptian mummies) can be explored only if these physical phenomena are present in the moments of investigation (e.g., surgery, x-rays). Physical objects that are not present in investigations may nevertheless play a role, such as when individuals think about particular objects or even about their absence in a given research setting. But in this case, it is these individuals' thoughts about these objects—i.e., psychical phenomena—that are present and that can thus be investigated, but not the physical objects that are being psychically represented in and of themselves.

Matching Spatial Properties: Extroquestive and introquestive methods

The TPS-Paradigm derives and defines two further categories of methods on the basis of the spatial properties of the phenomena under study—i.e., their spatial location in relation to the material entity of the studied individual's body and their physicality versus "non-physicality".

Extroquestive methods (from the Latin *extro* meaning beyond, outside and *exter* meaning being on the outside) are defined in the TPS-Paradigm 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 perceptual ways on which extroquestion is based, individuals can also directly perceive many physical phenomena of their own bodies both external (e.g., hands) and, under particular conditions, even internal (e.g., blood and tissue

in open wounds). Importantly, physical phenomena of individuals' bodies can be directly perceived by other individuals as well—thus using extroquestion (as explored further below).

Introquestive methods (from the Latin *intro* meaning 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 psychical phenomena. This entails intricate challenges as the researchers themselves cannot directly perceive the particular phenomena under study but have to rely on individuals' externalisations, especially self-reports, as explored in this trilogy.

The TPS-Paradigm introduces these terms to denote the particular kinds of methods that are conceived on the basis of its elementary system comprised of the three metatheoretical properties and to differentiate these specific methods from various previous concepts and methods of intro*spection* and extro*spection* (cf., Boring 1953; Butler 2013; James 1890b; Locke 1689). The ending (extro- and intro)–*questive* or –*question* (from the Latin *quaerere* meaning to seek, ask, enquire, and from *quaestio* meaning seeking, investigation, enquiry, question) implies that these methods involve all kinds of sensation and perception (e.g., haptic, acoustic, olfactoric) rather than only visual ones as is implied by the ending –spective or –spection (from the Latin *spectare* meaning to look at, see, watch). The ending –questive or –question also implies the involvement of some active exploration on the part of the individuals who perceive the phenomena under study[7].

All physical phenomena that are external to the studied individuals' bodies can be explored using extroquestive methods. Individuals' internal physical phenomena (e.g., bones, ligaments) can also be explored extroquestively if invasive methods are used (e.g., surgery). For this reason, technical methods that make internal physical phenomena perceptible by human individuals (e.g., arthroscopy) are also referred to as extroquestive methods although these methods enable only *indirect* perceptions of the actual phenomena under study (e.g., during arthroscopy, surgeons can directly perceive only videos of bones and ligaments but not the bones and ligaments in and of themselves). The essential point for defining extroquestion is that the *same* internal physical phenomena (e.g., ligaments) can also be made *directly* perceptible by others under particular conditions, such as by using invasive methods (e.g., open joint surgery). The extroquestive accessibility of phenomena is important because it enables multiple individuals to perceive *one and the same* event (e.g., the bones and ligaments found in a particular knee joint of a particular individual) and this helps an intersubjective consensus to be reached on how to demarcate and categorise events (cf. basic conversion principles and encoding schemes below).

By contrast, neurosurgeons or neuroscientists cannot extroquestively perceive or make extroquestively accessible an individual's experiencings (e.g., pains, thoughts)—no matter what invasive and advanced technical methods they may use. Psychical phenomena can be directly accessed only by the individual him- or herself—i.e., introquestively—and by nobody else (Kant 1786; Locke 1689; Pauli 1927). This is a central point considered in the TPS-Paradigm (Uher 2013, 2014d). The fundamental imperceptibility of psychical phenomena by other individuals entails that, in contrast to physical phenomena, one and the same psychical event (e.g., someone's joint pains) can never be perceived by multiple individuals. This substantially complicates the ability to arrive at an intersubjective consensus on how to demarcate and categorise events (e.g., different kinds of experiencings conceived by individuals as different kinds of joint pains).

Finding such a consensus is also complicated by the fact that introquestive outcomes can be scientifically explored only through their externalisation in physical phenomena (e.g., behaviours, phonemes and morphemes of language; see part III below) because the primary results of introquestion are psychical phenomena in and of themselves. Thus, introquestive results—like the experiential phenomena that are being introquestively explored—cannot be directly perceived by others. Therefore, any scientific exploration of individuals' primary introquestive findings inevitably requires externalisation—this is called external

[7] This is also true for the ending –spective or –spection, as *spectare* can also mean to consider.

physicalisation in the TPS-Paradigm. Even if philosophers and researchers introquestively explore only their own psychical phenomena, they have to *publish* their findings—i.e., make them public, thus accessible to others (e.g., in Augustine 397; Brentano 1874; Husserl 1928). Otherwise it would not be research and would not be known. The TPS-Paradigm therefore conceives of introquestive methods not only as methods of trained and/or guided self-observation as is the case in many previous lines of introspection (e.g., Bühler 1907; Burkart, Kleining & Witt 2010; Butler 2013; Wundt 1888) but as a much broader spectrum comprising *all* methods that rely on both guided or non-guided self-observation and self-report, including standardised methods such as self-report questionnaires.

Excurse: Differences to operationalism

Importantly, the idea that extroquestive methods can only be used to explore physical phenomena and that the introquestive exploration of psychical phenomena also inherently requires external physicalisations—and thus extroquestive methods as well—should *not be mistaken for ideas of operationalism*. Operationalism aims to specify operations by which a given scientific concept is measured; some (refuted) operationalistic ideas suggest that scientific concepts can even be universally defined by uniquely specified measurement operations (Bridgeman 1927; Chang 2009). By contrast, by considering the necessity that, in order to enable communication in both everyday life and science, individuals must externalise information from their psychical phenomena in external physical phenomena that other individuals can perceive, the TPS-Paradigm takes a much more abstract view on phenomena in general (Uher 2014d).

In line with its aims, the TPS-Paradigm also specifies methodological principles and implications for the operationalisation of scientific concepts; but these implications refer to different issues (i.e., conversion principles, encoding schemes, see below). Specifically, from all words that individuals say (i.e., externally physicalise) and all behavioural acts that they exhibit in a given research setting, researchers select and define only particular words, phrases and behavioural acts as operationalisations (i.e., measurements) of particular scientific constructs in a given study. Hence, all phenomena defined as operationalisations of scientific constructs are physical phenomena. But vice versa, by far not all physical phenomena occurring in research settings are defined and used by scientists as operationalisations of particular scientific constructs. Moreover, researchers specify operationalisations for constructs of all kinds of phenomena (e.g., in physics) not only of psychical ones.

Furthermore, with regard to psychical phenomena, the TPS-Paradigm explicates various intricacies that derive from the different metatheoretical properties that can be conceived for the physical externalising phenomena and for the psychical phenomena to which externalisations refer. It emphasises that, given these differences, isomorphisms between these different kinds of phenomena can only be low and that this hinders straightforward externalisations of psychical events and, vice versa, straightforward inferences from externalisations to an individual's psychical events (cf. Moolenaar 2004; Toomela & Valsiner 2010; Uher 2013). Such considerations are not made in operationalistic approaches. By contrast, operationalisations are commonly (at least in interpretations) considered to be conceptually equivalent to the constructs that they are defined to measure, although constructs are abstract ideas and thus psychical phenomena, whereas operationalisations are always concrete physical phenomena.

The concepts of extro- and intro*question* differ from concepts of extro- and intro*spection* in essential ways. Specifically, the TPS-Paradigm considers that individuals can perceive and conceive of physical phenomena (e.g., a cherry) and of their own psychical phenomena (e.g., emotions) and that they can do so at the same time. Individuals' psychical phenomena may also directly refer to the particular physical phenomena that they extrospectively perceive in given moments (e.g., emotions about that cherry). In other words,

human individuals can extrospect and introspect simultaneously; both kinds of exploration are often inextricably interwoven (cf. contextuality of psychical phenomena; see part III below; Wundt 1896). Thus, for defining and differentiating research methods, if the focus lies on the *individuals under study*, introspection cannot be clearly differentiated from extrospection.

The TPS-Paradigm explicitly considers that all individuals—research participants and researchers alike—can always perceive and conceive of both physical phenomena and psychical phenomena at the same time. In fact, the researchers' own perceptions and conceptions of their study phenomena (e.g., their demarcations and categorisations of events) are the very means by which all science is made; thus, their extrospections and introspections are inseparably intertwined with their research (Kant 1781; Wundt 1896; Valsiner 1998, 2000, 2012). The TPS-Paradigm therefore bases the differentiation of introquestive versus extroquestive methods on its elementary system of the three metatheoretical properties that it considers. Accordingly, these methods are differentiated from one another and defined *a)* by the *particular phenomena under study*, explicitly considering that various other phenomena are likely present in the moments of investigation as well and that all individuals involved can introspect and extrospect at the same time, and *b)* by the *particular persons who perceive the phenomena under study and who provide, for the purposes of scientific investigation, 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 numbers, spoken words; see next section).

For extroquestive explorations of physical phenomena, these persons are the researchers and their trained assistants and observers. But these persons can also be the individuals under study—provided they follow explicated encoding schemes (see next section; for an example of such a study, see Uher, Werner & Gosselt 2013a). For introquestive explorations, by contrast, the persons providing the first semiotic representations of information from the phenomena under study can only be the individuals whose psychical phenomena are being studied because psychical events are imperceptible by others in principle. Researchers, their assistants and any other persons can perceive and thus record only the studied individuals' externalisations but not the actual phenomena under study (Kant 1786; Locke 1689).

In sum, all scientific investigations of physical phenomena inherently rely on the researchers (and their assistants') perceptions and conceptions of the phenomena under study (cf. Wundt 1896). Scientific investigations of psychical phenomena inherently rely on the studied individuals' perceptions and conceptions of their own psychical phenomena and on these individuals' pertinent external physicalisations. Because of this, encoding schemes must be explicitly defined by researchers for each given study to allow them to compare and reconsider the data and results thus-obtained within and across studies and to explore how the individuals under study may actually conceive of and externalise their psychical phenomena (see also Uher 2014b, c in this trilogy). These are fundamental issues underlying the elementary problem of phenomenon-methodology matching as well as the possibilities for obtaining scientific quantifications of the phenomena under study (cf. Uher 2013, Desiderata 1d-g).

Philosophy-of-science foundations of scientific quantification and the elementary problem of phenomenon-methodology matching

Quantifications play a central role in science. To illuminate the fundamental methodological issues that quantifications entail for exploring individuals, in particular for psychical phenomena, the TPS-Paradigm elaborates philosophy-of-science foundations for *scientific* quantification. These foundations are based on its elementary system of the three metatheoretical properties that it considers and on established concepts of *set theory* and *algebra* (JCGM 2008). Accordingly, researchers must specify the sets of the elements to be quantified in the phenomena under study; this is referred to as the *set-theoretic requirement* of scientific quantification in the TPS-Paradigm. In addition, researchers must directly

compare the elements thus-defined with designated fixed standards to express their ratio as a real number; this is referred to as the *algebraic requirement* of scientific quantification.

Semiotic Representation of Information from the Phenomena Under Study

The TPS-Paradigm emphasises that the researchers' opportunities for meeting these two elementary requirements are *unequivocally* determined by the metatheoretical properties that can be conceived for the phenomena under study. Importantly, in explorations of healthy and fully intact individuals, it is mostly not the phenomena under study in and of themselves (e.g., behaviours) that are being directly explored by researchers as is the case when researchers dissect body tissue or add chemical indicators to identify particular chemical substances. Rather, scientific explorations of individuals commonly rely on persons (e.g., researchers, observers, individuals studied) who represent information from their perceptions and conceptions of occurrences of the phenomena under study (e.g., demarcated and categorised events of behaviour) in external physical phenomena that can be used as signs (e.g., spoken words, lexically encoded variables, numerical data). It is these signs that are analysed in scientific explorations (e.g., using content analyses, statistical analyses) *in lieu of the actual phenomena under study*.

The essential point is that the metatheoretical properties that can be conceived for the phenomena used as signs may be similar to or dissimilar from the metatheoretical properties that can be conceived for the actual phenomena under study. Crucially, the set-theoretic and algebraic requirements for scientific quantification must be fulfilled *with regard to the phenomena under study*, not only with regard to the phenomena used only as signs. This is not well considered in many fields of research exploring individuals as demonstrated by the example of taxonomic "personality" research in this trilogy (see Uher 2014b, c).

The TPS-Paradigm elaborates basic methodological principles and clear-cut criteria that researchers can use to decide whether or not particular methods allow them to meet the requirements of scientific quantification of their phenomena of interest. Such criteria have been missing so far, leading to the widespread practice of "quantifying" all kinds of phenomena by generating numerical data somehow or other but ignoring the fact that some metatheoretical properties substantially complicate or may not even enable quantifications. Therefore, to refer to numerical data that fulfil the set-theoretic and algebraic requirements with regard to the phenomena under study, the TPS-Paradigm uses the term *scientific* quantifications—as opposed to (subjective) quantifications denoting numerical data that do not fulfil requirements of scientific quantification (for details, see Uher 2014b in this trilogy).

Metatheoretical commensurability in conversions of information between different kinds of phenomena

The term *conversion* generally denotes that information is carried over from a particular kind of phenomenon to another kind of phenomenon. Such conversions can occur between all kinds of phenomena that are directly interrelated. Importantly, human individuals convert information between different kinds of phenomena whenever they communicate with others and also in many other areas of everyday life (e.g., when using technologies). For example, when perceiving elements in their external surroundings, individuals convert information from external physical phenomena (e.g., of an entity comprised by biotic materials) into information in their psychical systems (e.g., perception and conception of that entity as an "apple"). To communicate this information to others, it must be externalised in physical phenomena (e.g., spoken words) that are perceptible by others who then convert this information into information in their own psychical systems and so on (Uher 2014d). Such conversions of information between different kinds of phenomena are also elementary for all methodologies used for generating data in all sciences. They play particularly important roles in research on individuals where data generation largely relies on conversions of information by human individuals (e.g., researchers, observers, the individuals being studied) rather than on technical conversions, as this is possible in the natural sciences to a considerable extent (see also Uher 2014c in this trilogy; cf. Wundt 1896).

The TPS-Paradigm explores 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 in a given methodology (e.g., mathematical properties, lexical systems) and that are related to at least one of these three metatheoretical properties. For example, the rules for the divisibility of numbers are related to spatial units that can be conceived in the phenomena under study; numerals may be used to represent events that are conceived as distinct (e.g., nominal data) or to represent frequencies of events that are conceived as rather identically repeatable (e.g., metric data). 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[8] are then considered to be *completely metatheoretically commensurable* (derived from the Latin *commensurabilis*, which means having a common measure). Complete metatheoretical commensurability enables *appropriate* conversions of information between different kinds of phenomena.

By contrast, conversions of information between kinds of phenomena for which different frames of reference can be conceived inevitably entail a loss of information (for this reason, this is referred to as conversion rather than as translation or transcription in the TPS-Paradigm). As research is intrinsically targeted toward obtaining information that may not be known a priori about the phenomena under study, loss of relevant information need not become readily apparent in the physical phenomena that are used to represent the actual phenomena under study (i.e., signs). Significant loss of relevant information entails that the frame of reference of a given semiotic system cannot be applied to appropriately represent—and thus to explore—the phenomena under study. This constitutes the elementary problem of *matching the methodology to the phenomena under study* (i.e., the *phenomenon-methodology matching*; examples of such mismatches in taxonomic "personality" research are discussed in Uher 2014b, c in this trilogy).

Complete metatheoretical commensurability can be illustrated by the example of scientific (medical) investigations of red blood cells. Red blood cells, when taken out of the individual's body in a blood sample, can be extroquestively explored. The cells are temporally extended (they live for about 120 days) and they feature spatial units that are identically repeatable to a considerable degree (all cells are bounded by membranes). Given these (and further) properties, human observers (using microscopes) can demarcate red blood cells from one another and from other cells and substances in the blood (red blood cells look like oval biconcave discs), leaving hardly any room for intersubjective disagreement about what entity can be considered one ($n = 1$) red blood cell. This constellation of metatheoretical properties (i.e., extroquestively accessible, temporally extended, material physical) completely corresponds to the constellation that can be conceived for semiotic systems composed of lexically encoded variables and numerals taken down on paper or computer. In this example, isomorphisms between the phenomena under study and the phenomena used as signs can be high and their frames of reference can be considered completely metatheoretically commensurable, thus allowing for appropriate conversions of information between them.

These constellations enable researchers and their assistants to reliably demarcate, systematically categorise and explicitly define the particular sets of elements to be studied and quantified. The elements thus-defined can be counted (e.g., red blood cell count, RBC) and directly compared with fixed physical standards of measurement (e.g., to determine the red blood cells' mean corpuscular volume, MCV), thus fulfilling the set-theoretic and algebraic requirements for scientific quantification. These constellations of metatheoretical properties also enable automated technical conversions without involving any direct human

[8] The metatheoretical considerations that the TPS-Paradigm makes about *frames of reference* should not be confused with concepts of relational frame theory of human language and behaviour, which explores how human individuals develop higher cognitive abilities and acquire language on the basis of their abilities to relate events to one another (cf. Hayes, Barnes-Holmes & Roche 2001).

perception of the phenomena to be quantified in and of themselves (e.g., automated haematology analyser perform complete blood counts).

Consent-based commensurability in conversions of information between different kinds of phenomena and basic conversion principles

If metatheoretical commensurability can be assumed only partially or not at all, commensurability must be established on the basis of decisions. These decisions are made by the persons who directly perceive the phenomena under study and who provide the first conversions of information from these phenomena in information in other kinds of phenomena that can be used as signs. If these decisions are made explicit and specified in intersubjective agreement, this is called *consent-based commensurability.*

For establishing consent-based commensurability, the TPS-Paradigm specifies *basic conversion principles* that are relevant for conversions of information between kinds of phenomena that differ from one another in their forms with regard to one or even all of the three metatheoretical properties considered. *Conversion Principle 1* states that differences in the phenomena's spatial location in relation to the individual's body (i.e., internal versus external) may constrain conversions of information if, through these conversions, the phenomena under study are altered in and of themselves. *Conversion Principle 2* denotes that constraints for conversions of information may arise if one or all of the phenomena that are involved have only brief temporal extensions (i.e., are momentary) and, in particular, if one or even both of the phenomena that are involved feature units that vary in temporal extension and 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 spatial units that vary in their spatial extension and that are thus identically repeatable only to some extent or if spatial units cannot be conceived at all.

Conversion Principle 1 plays a role when, in explorations of individuals' inner morphology (e.g., liver tissue) and physiology (e.g., metabolic processes in the liver), technical and invasive methods that infringe on the integrity of the individual's body are used, thereby altering the phenomena under study. Moreover, this principle plays a fundamental role in explorations of psychical phenomena. Given their tight interconnections with the phenomena used for externalising information from them (cf. psyche–external surrounding connection in part III below) and given their functions for the individual, psychical phenomena may be altered through every externalisation, in particular, if semiotic representations are used (as explored in detail in part III below). Moreover, research settings in and of themselves may change individuals' psychical phenomena as well as their externalisations. As Kant stated "The human being who notices that someone is observing him and trying to study him will either appear embarrassed, and then he cannot show how he really is, or he will disguise himself and then he does not want to be known as he is[9]" (1798/2000, p. 5).

Conversion Principles 2 and 3 can be illustrated using the example of investigations of behaviours, such as the human gesture of waving hello to others. Waving is located external to individuals' bodies and can thus be explored extroquestively. But human individuals can wave hello in very different ways; for example, they can move their hand in front of their bodies just a hand's-breadth back and forth or they can move their arms in almost closed circles around their heads (not to mention the different directions in which hand and arms can be moved and that only one or both hands and/or arms can be used). Given this considerable variability in the spatial units that can be conceived for these behaviours, what entity can be demarcated and categorised as *one* ($n = 1$) hello wave? Which particular entities can be considered to be of the same kind, thus as identically repeatable at least to some extent? Moreover, even if comparable spatial units can be

[9] Translated original: "Der Mensch, der es bemerkt, dass man ihn beobachtet und zu erforschen sucht, wird entweder verlegen (geniert) erscheinen, und da kann er sich nicht zeigen, wie er ist; oder er verstellt sich, und da will er nicht gekannt sein, wie er ist." (Kant 1798/2000, p. 5).

identified in particular waves, they can also differ in their temporal extension. Can a quick wave and a slow wave be conceived as entities of the same kind? For phenomena featuring spatial and temporal units that vary considerably and that are identically repeatable only to some extent, there is considerable scope for making decisions about how to convert information from the perceived events into particular physical events of semiotic systems (cf. Uher 2011b). Therefore, explicit encoding schemes are required.

Meeting the set-theoretic requirement of scientific quantification: Establishing explicit encoding schemes

To enable scientific quantifications, the conversion of information from the phenomena under study into the phenomena used as signs must be done systematically and according to explicitly defined assignment rules (e.g., coding schemes); this is referred to as *encoding* (also coding) in the TPS-Paradigm—as in many fields of research as well. It is only at this point that previous debates about the problem of phenomenon-methodology matching start their considerations.

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 (e.g., spatial and temporal extensions of hello waves) as perceived and conceived by human individuals (e.g., researchers, observers) can be demarcated and categorised in what ways and how the thus-defined sets of elements can be represented through which particular signs (e.g., behavioural variables, numerals). The basic conversion principles elaborated in the TPS-Paradigm for each of the three metatheoretical properties specify the basic issues that must be addressed by researchers when establishing encoding schemes for any given study in order to specify explicitly defined sets of elements to be quantified for fulfilling the set-theoretic requirement of scientific quantification. These issues are well considered in many fields of behavioural research (e.g., explicitly defined ethogrammes and coding schemes). But they are often only insufficiently considered in many fields of psychological research, especially in research on "personality" (see below and Uher 2014b, c in this trilogy).

Meeting the algebraic requirement of scientific quantifications: The concept of time-relative probabilities

To meet the algebraic requirement of scientific quantifications, researchers must directly compare the demarcated, categorised and explicitly defined sets of elements of the phenomena under study with unchanging physical standard units of measurement to express their ratio as a real number (JCGM 2008). Again, crucially, these requirements must be fulfilled *with regard to the phenomena under study*, not only with regard to the physical phenomena that are used to represent information from the phenomena under study for the purposes of scientific investigation (e.g., lexically encoded variables, numerals). The TPS-Paradigm highlights that the possibilities of meeting these requirements are unequivocally determined by the particular constellation of the forms that can be conceived for each given kind of phenomenon with regard to the three metatheoretical properties considered.

Specifically, the physical standard units of measurement that are most widely used in science are based on measurements of *space* (e.g., distance or volume). In material physical phenomena, as they are temporally and spatially extended and feature spatial units that are identically repeatable to a considerable extent, the defined sets of the elements to be quantified can be compared directly with unchanging *spatial* standard units of measurement (e.g., micro-meter, feet, meter), thus fulfilling the algebraic requirement of scientific quantification. But direct comparisons with spatial standard units of measurement are complicated in phenomena that are bound to the immediate moment and that, moreover, feature units of varying spatial and/or temporal extension (e.g., behaviours; cf. the different ways of waving hello). In most observational contexts in research and everyday life, single behavioural events can seldom be directly compared with fixed spatial standards of measurement (e.g., of distance) in the moments in which the events occur (as is possible, e.g., by using a yard stick to measure the height of a jump but is much less possible for

measuring distances between individuals who are socially and physically interacting with one another in a game).

To meet the algebraic requirement of scientific quantification for such kinds of phenomena, the TPS-Paradigm introduces the concept of *time-relative probabilities* in which not space but *time* is used as the physical standard unit of measurement to quantify the occurrences of defined events. Specifically, nunc-ipsum methods generate log files of the (non-)occurrences of defined events (e.g., particular behavioural events) from which quantitative measurements are obtained by accumulating the registered events over repeated occasions. As momentary phenomena fluctuate often, the measurements thus-obtained can be only *probabilistic*. Time-relative probabilities are then obtained by relating the occurrences of defined events to the periods of time during which they were recorded and that are also precisely specified in terms of their sets of elements studied (i.e., basic time units, time samples, occasions; for details, see Uher 2013, pp. 6-11).

As all sets of elements to be quantified are specified on the basis of explicit encoding schemes and as the elements thus-defined can be directly compared with the physical standard units of the time in which they were recorded, the concept of time-relative probabilities allows researchers to meet the set-theoretic and algebraic requirements of scientific and even *ratio-scaled* quantification of momentary and fluctuating phenomena featuring units that vary spatially and/or temporally. This concept, as it enables ratio-scaled quantifications, also allows for scientifically quantified comparisons not only of averages but also of variabilities and ranges in the occurrences of events across time (e.g., occasion-to-occasion variability or longitudinal trajectories), across groups of individuals (e.g., age and gender differences), across studies, etc. It also enables scientifically quantified comparisons within and between individuals as required for comprehensive taxonomic explorations of "personality" (for details, see part IV below, Uher 2014b and in particular 2014c in this trilogy; Uher 2013).

III) The various kinds of phenomena explored in research on individuals: Metatheories and methodologies required for their investigation

The foundations outlined above (part II) are now used to explore in more detail the various kinds of phenomena that the TPS-Paradigm differentiates on the basis of its elementary system of the three metatheoretical properties. The following (part III) derives implications for the metatheories and methodologies that are required for investigations of these phenomena *in individuals in general*. Thereafter (part IV), the article derives specific implication for explorations of *individual-specificity* in each given kind of phenomenon, which is conceived of as "personality".

Phenomena of morphology and physiology

In the TPS-Paradigm, *morphology*[10] denotes living organisms' bodily structures and their constituting parts. Morphological phenomena can be internal (e.g., bones) and external to the individual's body (e.g., face), some can also be both (e.g., outer skin). These phenomena are temporally extended, but they can also change over time, in particular during ontogeny (e.g., physiognomy). Morphological phenomena are material physical phenomena; thus, they feature spatial units that allow for identical repeatability of events to a considerable extent (e.g., atoms, molecules, cells, organs, body parts).

Physiology denotes the chemical and physical functioning of these structures. Physiological phenomena are primarily internal to the individual's body (e.g., blood sugar), but some can also become external (e.g., sweat, electro-dermal activity). Many of these

[10] Morphology and physiology here denote the organismal structures and functions in and of themselves, not the scientific disciplines exploring them. In psychology, these organismal properties are often referred to as "biology" (e.g., as opposed to "culture"), but across disciplines, the term biology is conceived more broadly (e.g., comprising also ecology) and covers various kinds of phenomena that are differentiated in this paradigm.

kinds of phenomena are not strictly bound to the present moment (e.g., blood sugar levels), but some are strictly momentary (e.g., heart beat). Physiological phenomena are physical though not necessarily material in and of themselves (e.g., electric potentials); spatial units can be identified through the morphological phenomena in which they occur.

These metatheoretical properties of morphological and physiological phenomena enable extroquestive explorations; multiple individuals can directly perceive *one and the same event*—by using invasive methods for exploring internal phenomena and technical means for exploring micro-level phenomena and momentary phenomena. This facilitates reaching intersubjective consensus on the demarcation, description and categorisation of events to establish explicitly defined sets of elements to be quantified. It also allows for direct comparisons of occurrences of events thus-defined with designated physical standards, thus enabling scientific quantifications and technology-assisted measurements (for details, see Uher 2014c in this trilogy; cf. Uher 2013).

Phenomena of behaviour

The TPS-Paradigm defines *behaviours* as the "external changes or activities of living organisms that are functionally mediated[11] by other external phenomena (Millikan 1993) in the present moment" (Uher 2013; Uher et al. 2013a; Uher et al. 2013b). Importantly, not all external changes or activities are behaviours as they can also be mere by-products of an organism's chemistry and physics (e.g., heat) or provide the function of regulating an organisms' physiology (e.g., loss of heat serving thermo-regulation). Functional external changes or activities are behaviours only if their functions have *reference to* other external phenomena or to relations to them (Millikan 1993). For example, freezing in prey animals, a sudden cessation of any external activities or movements, is a behaviour because it is an external change that is functional in reference to other external phenomena (e.g., a predator, the abiotic external surroundings) in the present moment (e.g., by making the prey animal less salient to its predator, which may help to prevent an attack).

This definition of behaviour differs in important ways from previous conceptions in psychology. Specifically, neither physiological responses nor mental activities are conceived of as behaviours; this differs fundamentally from concepts of behaviouristic paradigms (e.g., Skinner 1957). Rather, the TPS-Paradigm conceptually differentiates physiological, behavioural, psychical and other kinds of phenomena from one another on the basis of the three metatheoretical properties that it considers because insufficient consideration of these properties and of the particular frames of reference that they establish would entail serious mismatches with the methodologies applied (for details, see Uher 2014b, c in this trilogy). For the same reason, the TPS-Paradigm refrains from making a priori assumptions about the potential causation of behavioural phenomena in other kinds of phenomena (e.g., in the psychical system or in the external situation, see below) as is implied, for example, by the concepts of "goal-directed" actions or behavioural "responses" in some cognitivist paradigms. In addition to entailing methodological mismatches, such concepts overlook the fact that in individuals, as they are complex living systems, the events of a given phenomenon can be dynamically interrelated to and co-determined by events of *all* kinds of phenomena in various (subsidiary) systems that are both internal and external to the individual. Concepts implying potential causation in only one specific kind of phenomenon fail to meet this complexity.

Hence, behavioural phenomena are located entirely external to the individual's body. Importantly, behaviours are bound to the immediate moment; many behavioural events are of only brief temporal extension and highly fluctuating (cf. Morris 1988). Therefore, events can be perceived and thus be recorded only *while* they are still ongoing or immediately thereafter. Behaviours are physical phenomena but immaterial in and of themselves (e.g., movements). Behaviours are continuous and dynamic processes in which rather constant

[11] 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).

spatial units suggesting clear demarcations of single events are largely absent. But demarcations of events (e.g., walking) can be made on the basis of the material physical properties of the external surroundings (e.g., ground surface) and of the individual's body to which behavioural phenomena are bound (e.g., legs). This also entails the identical repeatability of behavioural events to some extent (e.g., steps).

The external physical properties of behaviours enable direct perceptions of one and the same event by multiple individuals, thus extroquestive methods. But joint perceptions of one and the same event are complicated by the behaviours' limited temporal extension, which inherently requires nunc-ipsum methods. Further constraints arise from the lack of rather constant spatial units in behaviours in and of themselves. But given their external physicality, these constraints can be reduced by technically converting these phenomena into other kinds of physical phenomena (e.g., audiovisual records; see also Uher 2014c in this trilogy). This constellation of properties facilitates reaching intersubjective consensus on the demarcation, explicit description and categorisation of the particular phenomena and events to be studied, thus fulfilling the set-theoretic requirement of scientific quantification.

Importantly, however, the momentariness of behaviours entails that single events can be directly quantified only if direct comparisons with unchanging physical standards of measurement (e.g., of distance) are possible either *while* the behavioural event to be quantified is occurring (e.g., using a bar to measure the height of a high jump) or directly after the event occurred such as using behavioural residuals (e.g., the foot prints that result from a long jump). But such opportunities are absent in most cases of behaviour observation in either research or everyday life. Likewise, the fluctuations of behaviours hinder direct comparisons between events of the same defined kind: within the same individual because previous events have already ceased to be and between individuals because individuals' behaviours are seldom spatially and temporally exactly in parallel with one another to enable direct comparisons (as, e.g., in foot races; Uher 2013).

Momentariness and fluctuations entail that every event of behaviour explicitly defined in terms of directly perceivable properties can be registered only in its occurrence (or non-occurrence). In behaviour observations, nunc-ipsum methods therefore generate log files of behavioural occurrences, not quantifications. Only in a second step are the registered occurrences accumulated over repeated occasions and set in relation to the periods of time in which they were recorded using the concept of time-relative probabilities, thus fulfilling the algebraic requirement to generate ratio-scaled *scientific* quantifications (for details, see Uher 2013; comprehensive empirical applications are demonstrated in Uher et al. 2013b).

Behaviour-rating methods, by contrast, require observers to *directly quantify* degrees of intensity or frequency for the observed behavioural events without any opportunity for direct comparisons with unchanging physical standards of measurement. Even if ratings are made in real-time (e.g., ratings of videotaped behaviours), to quantify degrees, observers must compare the events they just observed with other events of the same kind but that, necessarily, have already ceased to be and of which observers have retained but memories. Hence, observers can *compare their current perceptions only with reconstructed memories of past perceptions*. But memories no longer reflect these past perceptions as originally experienced but represent them in inherently processed, abstracted and integrated forms (see next section). Such direct comparisons between perceived events of different kinds of phenomena inevitably entail methodological mismatches because these phenomena's very different metatheoretical properties require different methodologies.

As behaviours are functionally mediated by concurrent external events, the same external activity or externalisation can have different functions in different surroundings (cf. multi-contextuality). Moreover, as phenomena of life, these functionalities can also vary intra- and inter-individually. Investigations of behaviours therefore require *contextualised methods* specifying the particular constellation of external events in which the particular behaviours studied in a given individual occur in the moments of investigation (cf. *behavioural situations* below; for contextualised studies of individual behaviours, see Uher et al., 2008, 2013b; Wright & Zakriski 2003). This enables researchers to explore which particular kinds of external events may, in fact, functionally mediate the particular external changes or activities

of a given individual, thus making them behaviours. This, in turn, can be helpful for exploring potentially interrelated events and structures in the phenomena of individuals' psyche.

Phenomena of the psyche

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 relies on concepts of the psyche that are rooted primarily in German-language philosophy and psychology from the 19th and 20th century. It therefore refers to the events and phenomena of the psyche as *psychical* rather than psycho*logical*[12] 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 phenomena because individuals' immediate experiential reality always comprises emotional, volitional and other psychical phenomena as well (Wundt 1896). By conceiving of both conscious and non-conscious phenomena, 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).

The TPS-Paradigm conceives of psychical phenomena as "non-physical"—that is, as immaterial and lacking any spatial dimension (Kant 1798), which also implies a lack of any spatial units that are identically repeatable, at least to some degree. Given this, the entirety of psychical phenomena cannot be conceived of as a material physical entity that could be directly perceived as is possible for individuals' bodies; notions of "the psyche" in the TPS-Paradigm therefore do not and cannot imply reification as a concrete entity. The entirety of psychical phenomena can only be conceived—thus as a subjectively and intersubjectively constructed entity. "Non-physicality" furthermore denotes that psychical phenomena are lacking systematic relations to the material and immaterial physical phenomena by which they are accompanied (e.g., nerve cells and electric potentials in the brain; Fahrenberg 2008a, 2013; Wundt 1896). These "non-physical" properties of psychical phenomena entail particular challenges for research methodology, especially for attempts to apply quantitative methods (see below).

The spatial location of psychical phenomena in relation to the individual's body is entirely internal. 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; Pauli 1927). Psychical phenomena are therefore inherently subjective, individually unique and idiosyncratic (Weber 1949). One and the same event can never be perceived by multiple individuals (Kant 1786; Locke 1689). This precludes direct comparisons between individuals and substantially complicates reaching intersubjective consensus on the demarcation, conversion and encoding of events (see below; Levine 2003; Schrödinger 1958; Toomela 2008; Uher 2013, 2014b, c in this trilogy).

The TPS-Paradigm refers to the psyche also as the individual's psychical system, implying some properties that are common to all living systems, such as self-organisation and therefore also self-referentiality to a considerable extent. Each psychical event is dynamically interrelated to and co-determined by all concurrent events both internal and external to the individual as well as by past events within the same individual; psychical events are multi-contextually and historically embedded in the individual's life (Lewin 1935; Pauli 1927). Therefore, explorations of psychical phenomena require *contextualised* methods. As phenomena of life, psychical phenomena also vary intra-individually and inter-individually, and they are under continuous and irreversible processes of development (Sato

[12] Previous publications of the TPS-Paradigm (e.g., Uher 2013; Uher et al. 2013a, 2013b) still adhered to the undifferentiated English term "psychological" as a translation of both of the German terms *psychisch* and *psychologisch,* a differentiation found in many other languages as well (e.g., French, Italian, Dutch, Russian).

et al. 2010; Valsiner 2000, 2012; Varela et al. 1974). Psychological concepts can therefore be only probabilistic (Brunswik 1952, 1955; Uher 2013).

The one-sided psyche–external surrounding connection

Psychical phenomena are located entirely within the individual's body—just like the morphological and physiological phenomena with which they are complementarily connected in the Bohrian sense (e.g., neuronal systems, the central nervous system in particular). Through these internal physical phenomena (e.g., sensory organs), direct and highly flexible conversions are possible from information of phenomena in the individual's external surroundings (e.g., an apple) into information of his or her psychical phenomena (e.g., sensation and perception). But in the other direction, this is not possible. Direct and flexible conversions of information from the individual's psychical phenomena and the internal physical phenomena with which they are complementarily connected (e.g., brain matter and physiology) to phenomena in the individual's external surroundings are not possible (or only to comparably limited degrees, e.g., through metabolites). This is called the *one-sided psyche–external surrounding connection*[13] in the TPS-Paradigm.

Bridging this gap requires externalisations, other kinds of phenomena that mediate information from the individual's psychical phenomena to phenomena in the external surroundings. The individual's primary externalising phenomena are behaviours, which are external phenomena but bound to the individual's body. The morphological and physiological phenomena that are functionally necessary for behavioural phenomena to occur (e.g., muscle fibres and their enervation) are not specifically considered with regard to the psyche–external surrounding connection because they are spatially located inside the individual's body (as defined in the TPS-Paradigm) and thus, cannot in and of themselves directly connect to phenomena in the individual's external surroundings.

Psychical and behavioural phenomena essentially differ from one another with regard to their "non-physicality" versus physicality and their location being completely internal versus completely external to the individual's body. But their momentariness, dynamics and flexibility may be somewhat comparable to one another, enabling timely externalisation of information from the individual's psychical phenomena to their external surroundings. This nearness-in-time is particularly important for the individual's adaptation to and his or her interaction with dynamic and flexibly changing external surroundings, especially in social interactions. In comparison, other external phenomena of individuals' bodies are much less flexible; outer morphology is thereby more static than artificial outer-appearance modifications, which, however, ultimately result from behaviours (see below; Uher 2013).

The one-sidedness of the psyche-external surrounding connection and the bridging function of behaviour become strikingly apparent in individuals suffering from locked-in syndrome. In this pathological condition, individuals can consciously perceive; that is, they can internally convert information from their external surroundings into information in their psychical systems. But because of a loss of voluntary motor control, they cannot behave (e.g., produce speech, limb or facial movements); that is, they cannot externalise information from their psychical systems to their external surroundings (Laureys, Pellas, van Eeckhout et al. 2005).

Behavioural phenomena are so flexible and so neatly intertwined with psychical phenomena that individuals commonly hardly notice their vital function in bridging this gap. This may contribute to conceptions of psychical phenomena as "inner behaviours" (e.g., Koffka 1935; Skinner 1957; Sprung & Sprung 1984). But importantly, given the different metatheoretical properties that can be conceived for psychical and for behavioural phenomena (i.e., internal-"non-physical" versus external-physical), their frames of reference differ from one another, thus enabling only partial metatheoretical commensurability between them on the basis of their boundedness to the immediate moment. In addition, both kinds of phenomena are also connected with and thus influenced by various other kinds of phenomena both internal and external to the individual's body. For these reasons, one-to-

[13] Previously also labelled the *one-sided gap of the mind-environment connection* (Uher 2013).

one externalisations of information from psychical phenomena are not possible. Vice versa, straightforward inferences from behavioural events (i.e., behaviours or behavioural signs, e.g., spoken language; see semiotic representations below) to psychical events and assumptions of isomorphisms between interrelated events of these different kinds of phenomena cannot be made (Uher 2013). This is a crucial point for research methodology as explored below.

Temporal extension: Experiencings and memorised psychical resultants

In line with German-language psychological terminology, the TPS-Paradigm differentiates *experiencings* (*Erleben,* Stern 1924) from the *experiences* (*Erfahrungen*) that one can have in terms of information gained from past experiencings. Experiences are the *a posteriori* of experiencings; they are *memorised psychical resultants* that individuals retain of past events of experiencing in processed forms (cf. Bartlett 1932).

Experiencings are strictly bound to the immediate moment; they are highly ephemeral occurring only at the minuscule border between the what-is-no-longer and the what-is-not-yet that we conceive of as the present (Augustine 357; Pauli 1927; Stern 1924; Uher 2013; Valsiner 1998; 2012). Events of experiencings leave "impressions" on the individual's psychical system (von Uexküll 1909) where they are processed and memorised, thus becoming experiences that are abstracted, interconnected with other experiences and integrated into the psychical system, which thereby changes permanently and develops continuously (e.g., Le Poidevin 2011; Valsiner 2012). Psychical resultants, as they are memorised, are inherently more temporally extended and are therefore perceived by individuals as comparably stable, although psychical resultants—just as experiencings, but necessarily slower than them—are in continuous processes of development as well (for details, see Uher 2014c in this trilogy; cf. Giordano 2014; Sato et al. 2010).

Given these microgenetic and ontogenetic pathways of development, two kinds of memorised psychical resultants can be differentiated on metatheoretical levels. The TPS-Paradigm conceives of these different kinds as *compositional structures* and as *process structures*—in line with its absolute presuppositions about individuals as living organisms (e.g., principle of emergence, multi-contextuality, self-organisation, dialectical processes). Compositional structures of psychical phenomena are perceived by individuals as the *contents of their experiential reality,* such as psychical representations of specific past events, abstracted ideas, beliefs and knowledge. Process structures refer to basic patterns in the *processing of these contents*, such as individuals' capacities for attention, abstraction, (re-)construction, memory span, volition and self-organisation.

Importantly, compositional structures can be accessed and process structures can be applied only in the individual's ongoing experiencings. Memorised psychical resultants can only be reconstructed, retrieved, activated and executed in an individual's experiencings. But the revival of a memorised experiencing once had is not that same past experiencing anymore (Le Poidevin 2011; Walach 2013; Uher 2013). It is a new experiencing in which the processed memory of the past one, as retained and integrated into the hitherto reached compositional and process structure of the individual's psychical system, is being reconstructed and reactivated (cf. Schacter & Addis 2007). But this reconstruction and reactivation is never merely identically repeated (Bartlett 1932) because all experiencings are always embedded in the context of all other concurrent events internal and external to the individual in the given moment. Reactivated memorised psychical resultants, as they become experiencings, can be processed, reconstructed, further developed and reintegrated before they are memorised anew; a well-known fact underlying many psychotherapeutic approaches (e.g., Kelly 1955).

Individuals commonly do not notice clear differentiations between the contents and the processes of their psychical systems because processes are always executed on some contents and because individuals can become aware of their memorised psychical resultants only in their ongoing experiencings. Similarly, individuals commonly do not notice clear differentiations between their experiencings and their memorised psychical resultants as can be made on a metatheoretical level on the basis of their temporal extension to some degree

because both kinds of psychical phenomena are intimately connected and interdependent and because the transitions between them are fluid during memorisation and reconstruction (cf. Gibson 1967). But regardless of people's awareness of this, these differences have important methodological implications because they determine which particular kinds of phenomena can be actually explored by a given methodology.

Methodological implications from the temporal properties of psychical phenomena: Nunc-ipsum introquestion, retro-introquestion and long-term memory-based introquestion in self-assessments

A first set of methodological implications derives from the particular temporal extension of psychical phenomena. Explorations of psychical phenomena, as they are internal and directly accessible only by the individual him- or herself, imperatively require introquestive methods. The boundedness of experiencings to the present moment actually requires real-time explorations, thus methods of *nunc-ipsum introquestion*. But attention and externalisation inevitably change the course of experiencings—that is, "inner observation in itself alters and obstructs the state of the observed object[14]" (Kant 1786/1968, p. 471; cf. Conversion Principle 1). This introduces particular intricacies to the scientific exploration of psychical phenomena and hinders nunc-ipsum explorations of more complex experiencings, thus allowing for explorations of only brief experiencings (e.g., sensory perceptions; cf. Wundt 1904).

In *retro-introquestion*, individuals are therefore given a task and asked, directly after its completion, to reconstruct the experiencings that occurred while executing it, thus, *ex post facto* and without disturbing them (e.g., Bühler 1907; Rosenbaum & Valsiner 2011). As experiencings are always contextualised, the particular retrieval situation should be representative and ecologically valid for those situations in which the experiencings have occurred for activating episodic memory and enabling accurate reconstructions. Suitable methods enabling such investigations are, for example, the methods of subjective evidence-based ethnography (SEBE; Lahlou 2006, 2011; Lahlou et al. 2009) and microgenetic methods (e.g., Diriwächter & Valsiner 2008; Wagoner 2009).

Necessarily, these methods inherently rely on the studied individuals' abilities to memorise and reconstruct their own psychical events. As nobody else can perceive the psychical events that are to be explored, the accuracy of the memorisations and reconstructions of the individuals under study cannot be validated by methods that are independent of these individuals. But vice versa, the individuals whose psychical phenomena are being studied can validate the researchers' demarcations, re-codings and interpretations of the studied individuals' externalisations and the researchers' inferences to and reconstructions of the psychical phenomena being studied. Therefore, the individuals under study should ideally be involved at least in some extent as is done in qualitative research (cf. techniques of member validation, communicative validation; Flick 2008). Their interpretations of results need not be accepted by researchers or be directly reflected in scientific theories. But the involvement of the individuals under study will help researchers to become aware of and to minimise potential anthropo-, ethno- and ego-centric biases (unintentionally) introduced by the researchers themselves (Lahlou 2011; Uher 2014b).

Importantly, the more time that has elapsed between experiencings and their introquestive revival and reconstruction, the more likely the memories of specific events will have faded as the psychical resultants developed from them will already be changed again through subsequent experiencings, abstractions, reconstructions and reintegrations into the psychical system. With an increasing time lag, individuals are therefore more likely to reconstruct particular past experiencings on the basis of abstracted and often decontextualised memorised psychical resultants (e.g., schemata, attitudes) that they have developed from and about patterns in the occurrences of the experiencings that they had in the past. As Kant expressed it "the places and circumstances of the time, if they are

[14] Translated original: ... und selbst die Beobachtung an sich schon den Zustand des beobachtbaren Gegenstandes alteriert und verstellt" (Kant 1786, p. 471).

enduring, bring about habits that… are of a different nature and that complicate a human being's judgement of himself; how he should conceive of himself, and even more, how he should conceive of the other with whom he is in touch[15]" (Kant 1798/2000, p. 5). In addition, some of these memorised psychical resultants may also be influenced by normative semiotic representations (see below). Therefore, with an increasing time lag, individuals will more likely reconstruct experiencings that they *believe* they often have or ought to have in certain situations rather than the particular ones that they *actually* had in a particular moment. As retrieval is susceptible to various fallacies of memory (Schacter 1999), temporal proximity enabling *short-term memory retrieval* is essential for retro-introquestive methods.

Self-report methods (e.g., standardised questionnaires) in which individuals are asked to report *habitual* experiencings (e.g., feelings), by contrast, rely on *long-term memory-based introquestion*. They require individuals to reconstruct psychical representations that they have developed from abstractions and generalisations made from wide arrays of past experiencings over time. Thus, although self-reports are reconstructed in the individual's experiencings in the moments of enquiry, their contents reflect *outcomes of past processions of experiencings* in terms of, for example, self-knowledge, self-concepts or personal narratives (cf. McAdams 2006) but not those past experiencings in and of themselves. This is well considered in many explorations of psychical processes (e.g., individuals' capacities for attention, their abilities for abstraction and for mental operation). *Achievement and intelligence tests*, for example, rather than asking individuals to report on their "habitual abilities" of mental processing, rely on nunc-ipsum methods in which outcomes of psychical processes (e.g., mathematical operations) are registered *immediately after their generation* and in the same situation and context in which they occur.

Methodological implications from the spatial properties of psychical phenomena: Indirect explorations based on individuals' externalisations

A second set of methodological implications derives from the internal and "non-physical" properties of psychical phenomena. Because of these properties, psychical phenomena cannot be perceived by other individuals in principle, and one and the same psychical event cannot be perceived by multiple individuals. The "non-physical" properties also preclude technical conversions of information from psychical phenomena into physical phenomena that other individuals could perceive—as this is possible for the immaterial physical phenomena in the brain with which psychical phenomena are connected in complementary ways (e.g., electric waves in the brain using electroencephalographs, EEG). This impossibility considerably complicates intersubjective comparisons of demarcations and encodings of one and the same event as perceived and made by the introquesting individual. But even for the introquesting individual him- or herself, the "non-physical" and thus non-spatial properties of psychical phenomena do not offer any point of reference that he or she could use to reliably demarcate and categorise defined units in the continuous flow of events that could be identically repeatable at least to some extent. Rather, the events of "the manifold of inner observation can be separated only by mere thought, but cannot be kept isolated from one another and combined again arbitrarily[16]" (Kant 1786/1968, p. 471). Given these properties, the set-theoretic requirement of scientific quantification cannot be fulfilled for psychical phenomena in and of themselves.

However, the specific formations that phenomena of the psychical system take on in any given individual are not essential. Their essential core is the functionality—the *meaning*—that they have for the individual in the overall context of its life (Dilthey 1894) and

[15] Translated original: „Ort und Zeitumstände bewirken, wenn sie anhaltend sind, Angewöhnungen, die, wie man sagt, eine andere Natur sind und dem Menschen das Urteil über sich selbst erschweren; wofür er sich halten, vielmehr aber noch, was er aus dem anderen, mit dem er in Verkehr ist, sich für einen Begriff machen soll..." (Kant 1798/2000, p. 5).

[16] Translated original: "…, weil sich in ihr das Mannigfaltige der inneren Beobachtung nur durch bloße Gedankenteilung voneinander absondern, nicht aber abgesondert aufbehalten und beliebig wieder verknüpfen lässt ..." (Kant 1786/1968, p. 471).

the specific context of the particular moment (for the definition of context, see below). Given that individuals and their psychical systems, as living systems, are self-referential to a considerable extent, the demarcation and categorisation of these meanings is solely a matter of subjective construction that can never be directly compared between individuals and that researchers cannot easily reconstruct because they have to rely on individuals' externalisations (e.g., spoken words) for which different metatheoretical properties must be conceived, thus precluding straightforward inferences (see below).

The "non-spatial" properties of psychical phenomena also impede comparisons with fixed spatial units of measurement (e.g., metric units). Specifically, *direct "quantifications" of psychical events*, such as degrees of frequency or intensity, as typically enquired about by standardised "personality" questionnaires, *are not possible* because experiencings are bound to the immediate moment. Thus, beyond comparisons between events co-occurring in the same or in consecutive moments (e.g., sensory perceptions, cf. Wundt 1904), individuals can *compare their ongoing experiencings only with reconstructions and retrievals of past experiencings*, which, however, are not stored in their original forms as once perceived but only in processed and abstracted forms. Thus, when trying to directly "quantify" particular kinds of experiencings, the particular past events from which abstracted memories are retained are unknown. In set-theoretic terms, this means that individuals are asked to quantify interrelations between elements, although the elements themselves are unknown, which violates basic requirements for scientific quantification (Uher 2013). Therefore, quantitative methods of data generation and data analysis are not suited to explore psychical phenomena *in and of themselves* (for details also see Uher 2014b, c in this trilogy; also e.g., Levine 2003; Loftus 1996; Schrödinger 1958; Toomela 2008, 2011; Weber 1949).

This fact is frequently overlooked, most likely because quantitative methods are applicable to the externalising physical phenomena (e.g., behaviours, spoken words) through which psychical phenomena are inferred and indirectly studied. The concept of *time-relative probabilities* allows researchers to fulfil the requirements of scientific quantification in investigations of individuals' *externalisations* of psychical phenomena. Specifically, many phenomena that individuals use for externalisations are momentary (e.g., behaviours, spoken language). Given their dynamic and tight interrelations with psychical phenomena, externalising phenomena are also often fluctuating. Hence, any measurements that could be obtained for externalisations of psychical phenomena can be only *probabilistic*. To meet the set-theoretic requirement of scientific quantification, researchers must specify the sets of elements of the physical phenomena that the studied individuals use for externalising their psychical phenomena (e.g., behaviours, spoken words of *everyday* language). Moreover, researchers must specify the sets of elements of the physical phenomena that they, as researchers, use to intersubjectively encode their reconstructions of the studied individuals' psychical phenomena (e.g., written words of *scientific* language; cf. Uher 2013, Desideratum 1g), which may overlap with the externalisations used by the individuals under study. To meet the algebraic requirement of scientific quantification, the occurrences of events thus-defined and as registered in log files using nunc-ipsum and retro-introquestive methods (e.g., using transcripts of interviews) are set in relation to the physical time during which they occurred, thus using time as the designated physical standard of measurement. Through accumulation over repeated occasions and specified periods of time, the obtained data are converted into *ratio-scaled quantitative data*. These data, as they represent *scientific quantifications,* can be explored using quantitative analyses, such as textual data analyses (examples are discussed in detail in Uher 2014b in this trilogy; cf. Lahlou 1996, 1998; Neuman 2014; Reinert 1983, 1990)

But importantly, these quantitative data represent the *physical phenomena* that are used to externalise and to intersubjectively encode the psychical phenomena under study. These quantitative results cannot be used to draw *direct* inferences to psychical phenomena for straightforward interpretations (cf. Moolenaar 2004; Toomela & Valsiner 2010; Uher 2013, Desideratum 7; Uher et al. 2013a, 2013b). Specifically, researchers have to rely on the studied individuals' externalisations without knowing about how people—each one individually at each given moment—convert information from their internal psychical events

into external physical events that others can perceive (e.g., spoken words). This requires careful consideration of the peculiarities of these externalising phenomena, in particular, of the different metatheoretical properties that can be conceived for them and of the implicit structures that they may contain in and of themselves (e.g., implicit structures of meaning contained in language; see below). Hence, the frames of reference of the psychical phenomena under study and of the phenomena used for externalising information from them cannot be completely metatheoretically commensurable. Therefore, to infer psychical phenomena and to explore how individuals construct meanings and how they externalise information from their psychical systems, introquestive methods and hermeneutic-interpretive approaches are required (e.g., in qualitative or ethnographic methods; Fahrenberg 2002; Gadamer 1975; Gillespie & Cornish 2014; Wundt 1921).

In sum, for psychical phenomena, unique metatheoretical properties can be conceived that entail methodological intricacies. Specifically, as psychical phenomena are imperceptible by other individuals, researchers must rely on the studied individuals' externalisations in other kinds of phenomena (Uher 2014d). As a consequence, explorations of psychical phenomena inherently require purposeful combinations of a plurality of complementary methodologies. Extroquestive methods and scientific quantifications are required to explore the studied individuals' externalisations. Introquestive and hermeneutic-interpretive methods are required to reconstruct from these externalisations the actual psychical phenomena under study as well as their possible relations to the externalisations made (cf. Fahrenberg 2008b, c; Wong 2009; Wundt 1894, 1920, 1921). From this it also follows that studying psychical phenomena imperatively requires also studying individuals' behaviours and their semiotic representations (e.g., language; cf. Bühler 1934; Valsiner 1998; Vygotsky 1934).

Phenomena of semiotic representations

To enable social exchange about psychical phenomena, as these are entirely internal and "non-physical" and therefore imperceptible by others, individuals must *external*ise the meanings that particular psychical phenomena (e.g., experiencings, retrieved memorised experiences, knowledge) have for them. In the TPS-Paradigm, *externalisation* means that individuals must *physically represent* information from their psychical phenomena (e.g., meanings) in information in behaviour or in matter. Therefore, this conversion of information is also referred to as *external physicalisation* in this paradigm (for details, see Uher 2014d; cf. objectivation, Moscovici 1961).

For transmitting meanings of vital importance, species-specific behavioural repertoires have evolved. In addition, meanings can also be externalised in physical phenomena bound to individuals' bodies (e.g., movements, vocalisations) that, unlike species-specific behaviours, have no (evolutionarily derived) fixed a priori function in a species and that thus need not be behaviours. To such external bodily phenomena, meanings can be assigned *arbitrarily* (cf. Holloway 1969), which makes these external changes or activities functional—and thus, (*semiotic) behaviours*. When such as*sign*ments are psychically represented by multiple individuals in socially shared ways (i.e., are co-constructed), then the particular behaviours become *behavioural signs* (e.g., gestures, spoken language). Meanings can also be assigned to material phenomena that are independent of individuals' bodies (i.e., stones, pottery) and that thereby become *material signs* (e.g., hieroglyphs, sculptures, insignia). Signs are created to externally and physically represent (i.e., to semiotically represent) meanings for facilitating and (for more abstract meanings) for first enabling their social co-construction. Human communities have developed comprehensive semiotic systems involving both behavioural signs and material signs that help individuals to overcome the fundamental imperceptibility of psychical phenomena by others, thus promoting social exchange and coordination (for details, see Uher 2014d; cf. Kant 1786).

As psychical phenomena, meanings are always bound to individuals. Therefore and although meanings are also externally physicalised in signs (e.g., gestures, writings),

semiotic representations as well are always *bound to the individuals who create and co-construct them*. The TPS-Paradigm therefore conceives of semiotic representations as composite kinds of phenomena comprising psychical phenomena (e.g., experiencings, memorised psychical resultants) that are *tightly intertwined* with particular physical phenomena that are located external to individuals' bodies (e.g., behaviours, external materials like paper, stones, pottery). Crucially, the external physical phenomena (i.e., signs) comprised by semiotic representations cannot be understood without the particular psychical phenomena (e.g., meanings) with which signs are tightly intertwined. This is because meanings are not inherent to the physical phenomena that are used as signs by particular communities. Rather, it is the assignment of meanings that first turns external physical phenomena into signs. Thus, although many material signs (e.g., writings) can be physically separated from individuals' bodies, the composite phenomena of semiotic representations (e.g., "culture"), in and of themselves, cannot be explored if the psychical phenomena are excluded from the considerations. *Exclusive conceptual separations,* as made in dualistic conceptions, such as when aiming to explore influences of language or "culture" on individuals' "personality", *are not possible*—unless the external physical phenomena are considered only as such (e.g., paper, stones, pottery) rather than as signs. Dualistic conceptions therefore entail circularity in exploration (for examples in taxonomic "personality" research, see Uher 2014c in this trilogy).

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). Inclusive conceptual separations can be made on the basis of the forms that the phenomena involved take with regard to the three metatheoretical properties considered in the TPS-Paradigm. Thus, semiotic representations are phenomena with *heterogeneous metatheoretical properties* that always comprise both "non-physical" and physical events, both internal and external events and they may also comprise both momentary (e.g., experiencings, behavioural signs) and non-momentary events (e.g., material signs). The internal structures of the phenomena of semiotic representations are therefore more complex than those of any of the basic kinds of phenomena as conceived in the TPS-Paradigm.

Inclusive conceptual separations enable important insights into the functions that semiotic representations fulfil in people's lives for overcoming the fundamental imperceptibility of psychical phenomena by other individuals but also into the intricacies that are thereby entailed (Uher 2014d). Specifically, semiotic representations comprise different kinds of phenomena for which different metatheoretical properties can be conceived, thus precluding complete metatheoretical commensurability between their frames of reference. This entails that isomorphisms between their events can be only low; thus, one-to-one externalisations of psychical events in signs and, vice versa, one-to-one inferences from individuals' semiotic externalisations to their psychical events are not possible.

This impossibility is also due to implicit structures that are inherent to the semiotic representations of a given community—to both the external physical phenomena used as signs (e.g., phonetics) and their assignments to particular psychical phenomena (e.g., semantics). These structures may derive from and implicitly reflect socially shared abstractions, reconstructions and generalisations of the experiencings of individuals from past generations that first created the semiotic systems (cf. Gergen 1973; Valsiner 2012). The implicit structures that are contained in semiotic representations inevitably influence individuals' psychical processes, and thus, also the compositional and process structures of their memorised psychical resultants. For example, linguistic abstraction enables abstract thinking and the development of abstract psychical representations (Lahlou 1996; Neuman, Turney & Cohen 2012; Peirce 1902, CP 4.227; Uher 2013; Whorf 1958; for details and examples from taxonomic "personality" research, see Uher 2014c in this trilogy).

For these reasons, the lexical signs that individuals use for externalisations cannot denote the psychical events in the same ways in which individuals perceive them in a given moment (Vygotsky 1934). Many experiencings are generally not easily verbalised—i.e., fit into a pre-existing and socially shared system of semiotic externalisations (Brower 1949;

Kelly 1955; Komatsu 2012; Valsiner 2012). Moreover, as meanings are bound to individuals' memories and always reconstructed anew in individuals' experiencings, meanings continuously change and develop in single individuals and especially in communities of individuals. But these changes need not be reflected in the physical events used for their externalisation (e.g., words, monuments) that are (often purposefully chosen to be) more persistent and that also serve to slow down the inevitable change in meanings (for details, see Uher 2014d).

These peculiarities have important methodological implications. As meanings vary within and between individuals and over time and as meanings are not inherent to the signs by which they are externally represented (e.g., phonemes, graphemes), the meanings that researchers construct for particular signs (e.g., statements in questionnaire items) therefore need not be the same as those *fields of meanings* that the studied individuals construct for them as this has already been demonstrated for some widely used standardised "personality" questionnaires (e.g., Arro 2013; Diriwächter, Valsiner & Sauck 2004; Rosenbaum & Valsiner 2011). Ignoring these important issues may introduce serious (anthropo-,) ethno- and ego-centric biases into the generation and analysis of data (see Uher 2014b in this trilogy) and the interpretation of results (see Uher 2014c in this trilogy), in particular in research on "personality" (see part IV below). This is a further point that argues for the idea that the individuals under study should ideally be involved at least to 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 and ethnographic research (Flick 2008; Lahlou 2011).

To conclude, the composite nature of semiotic representations as conceived in the TPS-Paradigm entails the peculiarity that their exploration is enabled not by a single kind of methodology *alone* (i.e., either extroquestive methods and scientific quantifications or introquestive and hermeneutic-interpretive methods). Instead, the methodologies must be selectively *chosen for each of the different kinds of phenomena* that are studied in the different steps of investigation and they must be combined with one another in complementary ways (see also Uher 2014c in this trilogy).

Phenomena of artificially modified outer appearance

A further composite kind of phenomenon conceived in the TPS-Paradigm comprises the phenomena of artificially modified outer appearance. These phenomena denote the parts of individuals' natural outer morphology that individuals can change and physically modify in addition to and independent of changes that occur naturally during ontogeny (e.g., hairstyle, tattoos) and to which they can also attach physical objects (e.g., clothing, accessories). These phenomena are material physical and located external to individuals' bodies. These artificial modifications are often targeted towards others' perceptions and used to convey particular meanings to other individuals; thus they may play important roles in social perception and communication. Individuals can modify their outer appearances far more quickly than natural changes can occur in their outer morphology. But in contrast to the fluctuating phenomena of behaviours, artificially modified outer appearances are much more temporally extended, which facilitates their perception by others, thus promoting their semiotic function. Importantly, these phenomena can be modified by the individual him- or herself; this is particularly relevant for the social construction of individuals' "personality"—both by themselves and by others (see part IV below). For these reasons, the TPS-Paradigm conceives of these phenomena as special kinds of semiotic representations that are characterised by their physical attachment to individuals' bodies, and it explores them accordingly.

Phenomena of contexts

External surroundings, settings or backgrounds are commonly conceived of as "environments" and conceptually separated from the individuals studied, such as when aiming to explore whether individuals' behaviours are influenced more by their "personality"

or a given situation (cf. the *person-situation controversy*) or whether individuals' "personality" is influenced more by innate properties or their developmental environments (cf. the *nature-nurture controversy*). This dualistic conception is likely based on the researchers' inherently extroquestive access to the individuals studied. It may also be based on the (implicit) recognitions that individuals' psychical phenomena are fundamentally imperceptible by others and therefore cannot be directly studied and that individuals' behavioural and semiotic externalisations are always influenced by both internal and external events. Given this, it is assumed that if external events are standardised or controlled, then all variations in individuals' externalisations must be due to internal influences, thus enabling investigations of individuals' psychical systems (Shweder & Sullivan 1990). But metatheoretically, such dualistic conceptions of contexts are not tenable (Morris 1988; Valsiner 1987).

The TPS-Paradigm considers the fact that internal influences involve not only psychical phenomena but also morphological and physiological, thus physical phenomena. It also considers that the same constellation of external physical events is not the same for all individuals (Lewin 1936; Rotter 1954; Shweder & Sullivan 1990). Rather, individuals interact only with those particular properties of their external physical surroundings that they can sensually perceive and that are relevant for them given their particular physical and psychical organismal properties (Locke 1689; Nagel 1974; von Uexküll 1909). In fact, individuals are so intimately interconnected with external physical events that contextual phenomena cannot be conceived when the individuals under study are excluded from the considerations; thus, *exclusive conceptual separations are not possible* and dualistic concepts inevitably entail circularity in exploration (as explored in Uher 2014c in this trilogy).

Given this and the philosophical presuppositions made about individuals as living organisms (cf. multi-contextuality), the TPS-Paradigm rejects dualistic conceptions and conceives of the *phenomena of contexts as composite kinds of phenomena* comprising 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. The further kinds of phenomena comprised by a given contextual phenomenon may be other basic kinds of phenomena and/or external phenomena that are independent from the material entity of individuals' bodies (e.g., buildings, books, other individuals, plants, rocks). 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 individual under study—*only inclusively* (cf. Valsiner 1987) on the basis of the forms that they take with regard to the three metatheoretical properties considered in the TPS-Paradigm. This composite conception also entails that heterogeneous metatheoretical properties can be conceived for the phenomena of contexts, such that they may comprise both external and internal phenomena, both physical and "non-physical" phenomena, and both momentary and non-momentary phenomena. Isomorphisms between interrelated events of different kinds of phenomena comprised by contextual phenomena are necessarily low, which entails that the structures of contextual phenomena are more complex than any of the basic kinds of phenomena as conceived in the TPS-Paradigm.

Concepts of situations: Behavioural situations and psychically relevant situations

The TPS-Paradigm conceives of a *situation* as the particular constellation of events that are physically present in a given moment and/or directly perceived by the individual under study. Specifically, an individual's situation always comprises internal physical events, because his or her body is always present, such as morphological and physiological phenomena determinating, for example, the individual's bodily or health constitution. From the universe of the psychical events of the individual under study, a situation comprises those elements that are ongoing in the present moment, thus all elements of the individual's present experiencings (including psychical resultants retrieved and reconstructed from memory). From the universe of all external physical events, a situation comprises those

events that are present in a given moment so that they are directly perceptible (consciously or not) by the individual under study.

Behavioural situations[17] are conceived of in the TPS-Paradigm as a special kind of situation that denotes the particular constellation of those external physical events that functionally mediate[18] the individual's external changes or activities in a given moment—that is, his or her behaviour. The events constituting behavioural situations, in and of themselves, are external and largely independent from to the individual's body, but the criterion for demarcating these particular events from the universe of all the external physical events that are present in a given moment is bound to the properties of that individual; hence they are conceptually separated from the individual under study only inclusively. This criterion is defined as the effectiveness with which independent physical events make functional the individual's external changes or activities that thereby become behaviours. Importantly, this demarcation is based on individuals' *external* bodily events (i.e., behaviours), rather than on internal events (i.e., psychical ones). One and the same event in both behavioural and other external physical phenomena can be directly perceived by multiple individuals and can therefore be studied with extroquestive methods and thus scientifically quantified.

For the same reason, behavioural and external physical events can also be directly related to one another to explore which particular external events independent of individuals' bodies functionally mediate particular behavioural events (e.g., using ethological and behaviour scientific methods, cf. Preuschoft 1992; Preuschoft & van Hooff 1995). Some methods are also used for exploring *potentially* associated psychical events in nonhuman animals (Hinde 1982) and young children (Wright & Zakriski 2003), which, however, requires careful consideration of potential anthropo-, ethno- and ego-centric biases on the parts of the researchers.

Behavioural situations, as they functionally mediate individuals' behaviours, are always also psychically relevant to individuals. But conversely, not every situation is also behaviourally relevant to individuals. In purely *psychically relevant situations* (e.g., reading), the individual perceives external physical events (e.g., text) and interacts with them only internally on the basis of his or her internal physical properties (e.g., sense organs) and psychical properties (e.g., perception and conception), thus without necessarily having to interact with them externally (i.e., behaviourally) as well (e.g., saccadic eye movements, turning a page). Differentiating behavioural situations from other kinds of situations allows researchers to scrutinise the ways in which individuals connect with external physical events that are independent from their bodies (i.e., how they bridge the one-sided gap of the psyche–external surrounding connection) while considering that isomorphisms between psychical and behavioural phenomena can be only low and straightforward inferences from behavioural events to psychical events cannot be made (cf. Toomela 2011; Uher 2013). The concept of "psychological situations" (Rotter 1954, 1981; Shoda, Mischel & Wright 1994), by contrast, denotes physical properties in the individuals' external surrounding that are psychically relevant to the individuals yet without differentiating the particular involvement of their behaviour (often due to insufficient differentiation of psychical from behavioural phenomena).

The particular physical events in the external surroundings that constitute a situation for an individual in a given moment can but need not be bound to the present moment. They become part of the situation only *while* they are mediating the individual's behaviour or *while* the individual can perceive them. Before and thereafter, they conceptually belong to the universe of physical events in the external surroundings. Events in the individuals' wider contextual layers of that universe (e.g., *socio-economic, sociocultural or societal systems*; cf. Bronfenbrenner 1979) can affect individuals only indirectly as mediated through physical events that are present in a given situation so that the individuals can directly perceive them (e.g., public media, goods in the shops, teacher and books at school). Once the individual has psychically represented the meanings of such events, they can also further affect the

[17] Previously called the "environmental situation" (Uher 2011a, 2011b, 2013; Uher et al. 2013b).
[18] This particular constellation may not always be (a priori) explicitly known.

individual (again, only indirectly) when the individual reconstructs the pertinent psychical representations in a given moment. These psychical representations, in and of themselves, can affect the individual directly in the moments in which they are reconstructed.

As psychically relevant situations inherently involve the construction of meaning on the part of the individual under study, their exploration requires not only extroquestive methods and scientific quantifications of the physical phenomena involved but also introquestive and hermeneutic-interpretive methods to explore the studied individuals' physical phenomena (e.g., perceptions, constructed meanings). Thus, a plurality of methodologies is required that are selectively and complementarily applied to explore each of the different kinds of phenomena that are comprised by the complex composite phenomena of contexts (see also Uher 2014c in this trilogy).

Culture: Systems of semiotic representations commonly conceived of as "environments"

Culture is commonly conceived of dualistically as "environment" in terms of contextual phenomena that are external to and independent from the individuals studied. But in the broadest sense, culture denotes semiotically mediated systems of socially shared meanings (Geertz 1973; Weber 1904)—thus, complex systems of semiotic representations. The TPS-Paradigm therefore conceives of cultures as *composite kinds of phenomena* comprising psychical representations of co-constructed meanings that are tightly intertwined with external phenomena in which these meanings are physically represented in socioculturally shared ways and that thereby become behavioural signs (e.g., phonemes, behavioural practices) and material signs (e.g., graphems, monuments). The events of both the psychical phenomena and the physical phenomena comprised by cultural phenomena may vary in their temporal extension; some events may be momentary and others not. It follows that, for cultural phenomena, heterogeneous metatheoretical properties can be conceived, resulting in highly complex internal structures and necessarily low isomorphisms between interrelated events of the different kinds of phenomena that are comprised.

Importantly, *cultural representations* (e.g., language)—as all semiotic representations—*always involve psychical phenomena per definition.* This means that cultural phenomena cannot be conceptually separated in exclusive ways from the individuals' psychical systems and their workings (Geertz 1973; Valsiner & Han 2008; Valsiner 1987, 1998, 2000). The physical phenomena comprised by cultural phenomena (e.g., cultural artefacts) can be separated from the individuals under study only inclusively on the basis of the three metatheoretical properties that the TPS-Paradigm considers, such as for exploring the particular meanings that individuals construct for and assign to particular physical phenomena. Exploring cultural phenomena therefore requires selective combinations of a plurality of complementary methodologies as described for semiotic representations (cf. Fahrenberg 2013; Wundt 1894, 1920, 1921).

IV) "Personality" as explored in the Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals

Based on the above-described metatheoretical and methodological foundations for research on *individuals in general* (part III), the TPS-Paradigm elaborates philosophy-of-science foundations for exploring individuals' *"personality"*. The following (part IV) first metatheoretically defines "personality" that the TPS-Paradigm conceives of as *individual-specificity* and then derives specific implications for exploring individual-specificity in each given kind of phenomenon explored in individuals (cf. Uher 2013, Desideratum 1a). Applications and implementations of these methodologies are elaborated and discussed through the example of taxonomic "personality" research in Uher (2014b and c) in this trilogy.

"Personality" conceived of as individual-specificity in all kinds of phenomena explored in individuals: Metatheoretical definitions

Definitions of "personality" vary greatly (cf. Allport 1937). Most established definitions refer to only some of the various kinds of phenomena differentiated in the TPS-Paradigm (for details, see Uher 2013). Decisions about which kinds of phenomena to consider—and which ones to discard—can be made only on the basis of absolute presuppositions. The TPS-Paradigm, in line with its transdisciplinary agenda, makes no particular presuppositions in this regard and therefore considers *all of the various kinds* of phenomena explored in individuals. The aim is to develop coherent and comprehensive metatheoretical and methodological frameworks that researchers can use to explore their particular kinds of phenomena of interest and that are helpful for establishing links between lines of research exploring different kinds of phenomena cf. Uher 2013, Desiderata 3, 6, 7).

In the occurrences of events in the various kinds of phenomena explored in individuals, which particular patterns are actually conceived of as "personality"? After all, not every occurrence of, for example, behavioural or psychical events in an individual is commonly referred to as "personality"—neither in everyday life nor in research. The notions of "a person's consistent patterns", "individual characteristics" and "individual uniqueness" that are commonly used in psychological definitions of "personality" are surprisingly vague for scientific definitions. Importantly, they fail to specify what is meant to be "consistent" with what and which patterns are considered "different", "unique" and "characteristic" and why. These notions also fail to differentiate from one another between-individual and within-individual variations and to consider complexity in both compositional structures and processes structures (as explored in detail in Uher 2014c in this trilogy). This is remarkable given that central kinds of the phenomena explored in individuals are heterogeneous, complex, momentary, dynamic and highly fluctuating. In such phenomena, patterns that are characteristic of a given individual cannot be directly recognised (Uher 2013).

The TPS-Paradigm conceives of "personality" as patterns in the occurrences of events that are specific to an individual—thus *individual-specific.* Patterns can be individual-specific only if they differ between individuals (i.e., are *differential*) in ways that are stable for at least some amount of time (i.e., are *temporally stable*; Uher 2011a, 2013). These concepts, together with the metatheoretical and methodological foundations of phenomenon-methodology matching and scientific quantification, allow researchers to explore individual-specificity in individuals' *averages*, for example, across time periods (e.g., individual-specificity in within-individual temporal stability of behavioural patterns), across various kinds of situations (e.g., individual-specific situation-behaviour profiles) and across various kinds of behaviours (e.g., individual-specific behaviour profiles; for some empirical demonstrations, see Uher et al., 2013b). In addition, these concepts enable explorations of individual-specificity in the *variabilities and ranges* in the occurrences of events of momentary and fluctuating phenomena, such as across specified time periods (e.g., individual-specificity in circadian or day-to-day fluctuations in physiological patterns). These analytical concepts are required to comprehensively explore individual-specific compositional structures and process structures of "personality" functioning and development (as elaborated in 2014c in this trilogy). The following outlines special methodological implications for the primary identification of individual-specificity in each given kind of phenomenon studied in individuals (cf. Uher 2013, Desideratum 1a).

Special methodological implications for identifying individual-specificity in each given kind of phenomenon

To identify individual-specificity, researchers must carefully consider the particular forms that can be conceived with regard to the three metatheoretical properties for each given kind of phenomenon. As their particular constellation constitutes the frame of reference of each given phenomenon, these properties unequivocally determine the methodologies that are appropriate to enable its exploration. Specifically, if complete metatheoretical commensurability cannot be conceived, researchers must define encoding

schemes that establish at least consent-based commensurability with the frame of reference of the particular phenomenon under study.

In individuals' *outer morphology* (e.g., physiognomy), temporally stable differential patterns can be identified rather directly because these phenomena are external, material physical and temporally more extended, thus enabling extroquestive methods and scientific quantifications. Under particular conditions (e.g., when individuals are next to each other), events can be simultaneously perceived in different individuals and be directly compared between them enabling the straightforward identification of differential patterns (e.g., body size, hair colour). If the morphological phenomena are known to be temporally extended, these differential patterns can be assumed to reflect individual-specific patterns.

In individuals' *internal morphology* (e.g., bones, ligaments) and in the phenomena of *physiology* (e.g., of the immune system), individual-specificity often cannot be directly perceived because these phenomena are internal and because of the micro-level extension of many of these phenomena (e.g., physiological phenomena). Identification of individual-specificity therefore requires the measurement of events in each individual (mostly obtained invasively and technically and in fluctuating phenomena also repeatedly) the post-hoc comparison of these individual patterns (i.e., after obtaining them) between individuals and over time.

In *behaviours* (e.g., social contact behaviours), individual-specific patterns cannot be directly perceived because behavioural phenomena are momentary and fluctuate and behavioural events vary in their spatial and temporal extension (Uher 2013). Individual patterns can be quantified only by the time-relative probabilities by which defined kinds of behavioural events occur and which inherently requires the accumulation of events registered repeatedly over time. The scientifically quantified measurements thus-obtained are compared after their collection (i.e., post-hoc) between individuals to identify differential patterns. To reflect patterns that are specific to individuals, differential patterns in time-relative behavioural probabilities must be stable across time periods longer than those in which the probabilities were first ascertained and in ways that are considered to be meaningful. Such meaning may be defined, for example by the strength of statistical correlations over specified time periods (for details, see Uher 2013; Uher et al. 2013b). This means that temporal patterns are to be explored in patterns that are in and of themselves defined by a certain temporal stability.

In *experiencings* (e.g., particular kinds of emotions, thoughts, motivations) and *memorised psychical resultants* (e.g., psychical representations, knowledge acquired, self-concepts) individual patterns cannot be directly perceived because psychical phenomena are fundamentally imperceptible by other individuals. This also precludes direct comparisons between individuals to identify differential patterns. Explorations inherently require introquestive methods and must rely on individuals' externalisations. Researchers must carefully consider that the physical phenomena used by the studied individuals for externalisations (i.e., behaviours, behavioural and material signs) have different frames of reference and therefore cannot be completely metatheoretically commensurable with the psychical phenomena to be explored. As experiencings are strictly momentary, and memorised psychical resultants (both the contents and the processing of these contents) can be activated only in experiencings, repeated nunc-ipsum or retro-introquestive methods are required for recording individuals' externalisations. These externalisations, as they are physical, can be explored using extroquestive methods and can be scientifically quantified through the accumulation of events across time to obtain individual patterns (e.g., using the concept of time-relative probabilities). The individual patterns thus-obtained are then compared post-hoc between individuals and over time to identify individual-specific patterns in the externalisations made. These findings are then explored using hermeneutic-interpretive methodologies and, ideally, by involving the individuals studied to some extent in order to reconstruct possible individual-specific patterns in the psychical phenomena that may be related to the externalisations explored and in the ways in which they are externalised by individuals.

Explorations of individual-specificity in psychical process structures provide some examples, such as intelligence and achievement tests, "performance-tests of personality" (Cronbach 1970) and some "objective personality tests sensu Cattell" (Cattell & Warburton 1967; Kubinger 2009). In these methods, outcomes of psychical processes that are executed in the individuals' ongoing experiencings (e.g., mathematical operations) are registered *immediately after their generation* and *repeatedly* across multiple occasions, and the accumulated outcomes are then set in relation to the physical time in which they were generated (e.g., IQ scores. Individuals' performances are then compared post-hoc between individuals and across time to identify individual-specific patterns (e.g., norm-referencing of IQ scores). Importantly, direct quantitative inferences on the psychical phenomena in and of themselves cannot be made given their particular metatheoretical properties; this point is frequently overlooked in the interpretation of results (see Uher 2014c in this trilogy).

In *semiotic representations*, individual-specificity cannot be directly perceived because physical signs cannot be interpreted without the meanings to which they are assigned. Individuals' use of signs (e.g., gestures, words) can be explored for stable differential patterns in the probabilities of the (co-)occurrences of particular signs that are scientifically quantified by relating them to the physical time in which they were used or to defined sets of signs, such as total number of words (cf. Schonhardt-Bailey, Yager & Lahlou 2012). This requires extroquestive methods and enables scientific quantifications. Individual-specific patterns in the use of signs can, but need not reflect individual-specificity in the fields of meanings that individuals construct for particular signs (e.g., words, questionnaire items) and for particular events and phenomena that are being semiotically represented (e.g., individual-specific behaviours). Identification of individual-specificity in meaning construction and in psychical representations (e.g., about individual-specificity in particular phenomena) and in the externalisations used requires introquestive and hermeneutic-interpretive methods (examples are discussed in Uher 2014b in this trilogy).

In *artificially modified outer appearance*, individual patterns can be identified more directly than in behaviours because the external material phenomena of outer appearances are temporally more extended (e.g., hairstyle, clothing). As many people modify their outer appearance from day to day, in contrast to natural outer morphology, individual patterns are scientifically quantified on the basis of records obtained using extroquestive approaches and on different days, accumulated over time and set in relation to the time periods in which they were obtained. The time-relative probabilities thus-obtained are compared post-hoc between individuals and over time to identify individual-specificity in the physical phenomena that are comprised by the phenomena of artificially modified outer appearance. To identify individual-specificity in the particular meanings that are attributed to these individual-specific physical appearances—by the individual him- or herself and by other individuals—introquestive and hermeneutic-interpretive methods must be applied.

In the phenomena of *contexts*, individual-specific patterns are not directly perceivable given the diverse kinds of phenomena that may be comprised. Their identification requires a plurality of methodologies that are each targeted toward the particular kind of phenomenon for which they are appropriate. For exploring individual-specificity, it must be considered that particular internal and external physical events have, in different constellations, different relevance for different individuals—for their behaviours in different ways than for their psychical systems. Hence, although in external physical material phenomena, individual patterns can be identified rather directly and compared post-hoc between individuals and over time, exploration of the *meanings and relevance* that they have for particular individuals requires introquestive and hermeneutic-interpretive methods to identify individual-specificity (examples are explored in Uher 2014b in this trilogy).

Summary

This article presented central foundations of the Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm). It started (part I) by highlighting that, because researchers themselves are always individuals, researchers

studying individuals encounter intricate challenges, in particular, high risks for anthropo-, ethno- and ego-centric biases and various fallacies of the human mind that influence the metatheories and methodologies that researchers develop. These peculiarities also entail the fact that, in research on individuals, "objectivity" can be only "intersubjectivity", which must be achieved on the basis of shared philosophical presuppositions.

The article (part II) outlined the nature and aims of the TPS-Paradigm and specified central absolute presuppositions that this paradigm makes about individuals. Basic epistemological concepts for exploring individuals were introduced such as the Bohrian principle of complementarity and concepts that consider the peculiarities that arise from the fact that individuals are living organisms (e.g., principle of emergence, multi-contextuality, causal and compositional connections, dialectical processes, self-organisation). The article introduced the paradigm's elementary system of the three metatheoretical properties that can be conceived for the various kinds of phenomena explored in individuals (i.e., spatial location in relation to the individual's material entity, temporal extension and physicality versus "non-physicality"). This elementary system also enables metatheoretical differentiations of these phenomena into the four basic kinds of the phenomena of morphology, physiology, behaviour and the psyche, and the three composite kinds of the phenomena of semiotic representations, artificially modified outer appearance and contexts.

From the philosophical presuppositions made about research on individuals, general epistemological principles were derived (i.e., methodological pluralism). The elementary system of the three metatheoretical properties was used to derive general methodological implications for the exploration of the various kinds of phenomena (i.e., nunc-ipsum methods, extroquestive and introquestive methods). Building on this, the article elaborated philosophy-of-science foundations of phenomenon-methodology matching (e.g., metatheoretical and consent-based commensurability, basic conversion principles) and of scientific quantification (e.g., set-theoretic and algebraic requirements, concept of time-relative probabilities). These elaborations provide clear-cut criteria that researchers can use to decide whether or not particular methodologies match a given phenomenon to be studied and whether or not particular phenomena can be scientifically quantified by using what particular methodology.

Thereafter (part III), these philosophy-of-science foundations were applied to define and to explore in more detail each of the various kinds of phenomena that the TPS-Paradigm differentiates. The article derived implications for the particular metatheories and methodologies that are required for exploring each given kind of phenomenon *in individuals in general*. Finally (part IV), the article introduced some philosophy-of-science foundations that the TPS-Paradigm provides for research on "personality", which it conceives of as individual-specificity in *all* rather than just some of the various kinds of phenomena explored in individuals. Specific methodological implications were derived for the identification of *individual-specificity* in each given kind of phenomenon considering their particular constellations of metatheoretical properties.

The two following articles in this trilogy apply the fundamentals of the TPS-Paradigm outlined in this article to explore the basic metatheories and methodologies that are used in research on individuals using the example of taxonomic "personality" research. The second article (Uher 2014b) focuses on the three methodological steps that are required to develop comprehensive taxonomic models of individual-specificity, illustrated by analysing some currently popular models as examples. The third article (Uher 2014c) explores the theoretical interpretations of the thus-obtained taxonomic models, constructs and data regarding the phenomena that these represent and elaborates on the different kinds of taxonomies that are required to comprehensively explore the process structures of individual functioning and development. In both articles, the presented analyses reveal frequent mismatches between the metatheories and the methodologies that are applied in the field. The articles show that these mismatches derive from a lack of explicit formulation and from insufficient critical reflection on the philosophical and metatheoretical assumptions that are being made by researchers as well as from widespread erroneous assumptions about the abilities of

particular methodologies to appropriately represent the targeted phenomena and the individual-specific variations in them.

The insights gained from this trilogy of articles highlight that transdisciplinary and philosophy-of-science perspectives are essential to help researchers overcome obstacles that hinder progress in the field and to open up novel avenues for future research.

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