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Original Article

Developing "personality" taxonomies: Metatheoretical and methodological rationales underlying selection approaches, methods of data generation and reduction principles

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Abstract

Taxonomic “personality” models are widely used in research and applied fields. This article applies the Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm) to scrutinise the three methodological steps that are required for developing comprehensive “personality” taxonomies: *1)* the approaches used to select the phenomena and events to be studied, *2)* the methods used to generate data about the selected phenomena and events and *3)* the reduction principles used to extract the “most important” individual-specific variations for constructing “personality” taxonomies. Analyses of some currently popular taxonomies reveal frequent mismatches between the researchers’ explicit and implicit metatheories about “personality” and the abilities of previous methodologies to capture the particular kinds of phenomena toward which they are targeted. Serious deficiencies that preclude *scientific* quantifications are identified in standardised questionnaires, psychology’s established standard method of investigation. These mismatches and deficiencies derive from the lack of an explicit formulation and critical reflection on the philosophical and metatheoretical assumptions being made by scientists and from the established practice of radically matching the methodological tools to researchers’ preconceived ideas and to pre-existing statistical theories rather than to the particular phenomena and individuals under study. These findings raise serious doubts about the ability of previous taxonomies to appropriately and comprehensively reflect the phenomena towards which they are targeted and the structures of individual-specificity occurring in them. The article elaborates and illustrates with empirical examples methodological principles that allow researchers to appropriately meet the metatheoretical requirements and that are suitable for comprehensively exploring individuals’ “personality”.

Key words:
personality assessment; lexical approach; standardized questionnaire methods; traits; Big Five Model and Five Factor Model; psychometrics; scientific quantification, contextualised methodologies; quantitative methods; phenomenon-methodology matching; emic approach and etic approach.

Contents

Scientific models targeted at providing comprehensive accounts of individuals' "personality" have found widespread use in research and applied fields. Over the last century, researchers have invested great efforts in developing such models. Some researchers have used their clinical experiences to develop models that are aimed at explaining individual functioning and the development of impairments and disorders (e.g., Freud 1923, Kelly 1955, Rogers 1961). Many other researchers have focused on specifying the "most important" individual differences in comprehensive taxonomic models that "would provide a common framework for research guided by different theoretical orientations and could guide the selection of variables for research" (John, Angleitner & Ostendorf 1988, p. 171). Aiming to tackle this fundamental task "impartially" and assuming that the "description of personality must precede, not follow personality theory", some prominent taxonomists advocated for "purely empirical" approaches (Costa & McCrae 1992, p. 861).

But specifically *what* is to be described first and *how? What is "most important",* and *how* can it be identified? The often-cited dictum "let the facts speak for themselves" overlooks that it is the researchers who decide what is considered a "fact", how these "facts" are encoded and analysed—and thus, what can ultimately be "found" (cf. Einstein 1926 cited in Heisenberg 1989; Toomela 2011).

> "If the notion continually recurs that those standpoints [that are needed to distinguish the important from the trivial] can be derived from the 'facts themselves', it is due to the naïve self-deception of the specialist who is unaware that it is due to the evaluative ideas with which he unconsciously approaches his subject matter that he has selected from an absolute infinity" (Weber 1949, p. 82).

This trilogy of articles

This article forms part of a trilogy in which the Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (briefly referred to as the TPS-Paradigm) is presented (Uher 2014a) and applied to scrutinise the basic metatheories and methodologies that researchers explicitly and/or implicitly apply to study individuals using the example of taxonomic "personality" research (Uher 2014b, c).

The first article (Uher 2014a) pinpointed profound challenges in research on individuals and presented central philosophical, metatheoretical and methodological foundations of the TPS-Paradigm. It introduced philosophical and epistemological presuppositions that the paradigm makes about individuals as living organisms and about the various kinds of phenomena that are frequently explored in individuals. The article elaborated philosophy-of-science foundations underlying the targeted matching of methodologies to the particular phenomena under study and derived explicit requirements for their scientific quantification. These foundations were applied to explore the metatheories and methodologies that are used and/or needed to investigate each kind of phenomenon in *individuals in general*. Building on these general implications, the article then derived central metatheoretical and methodological implications for research on "personality" that the TPS-Paradigm conceives of as *individual-specificity* in all of the various kinds of phenomena explored in individuals.

The present second article (Uher 2014b) briefly summarises (part I) relevant fundamentals and elaborates on the implications for research on individual-specificity that are then (part II) applied to analyse the three methodological steps required for developing comprehensive "personality" models: *1)* the approaches used to select phenomena and events to be studied, *2)* the methods used to generate data and *3)* the reduction principles used to extract the "most important" variants of individual-specificity and to construct taxonomies. Centrally, this article scrutinises the specific methodologies and methods that are used in the field with regard to their abilities to capture the particular kinds of phenomena towards which they are targeted, focussing on some currently popular taxonomies. The analyses reveal frequent mismatches and show that some explorations that are theoretically well justified (e.g., lexical approaches) have been empirically implemented only insufficiently

so far. Further means of exploration are derived from both the same and alternative theories that are needed to fully explore the targeted phenomena but that have not yet been tackled. The article critically analyses standardised questionnaire methods and shows how their widespread use in psychology has significantly hampered the empirical study of individual experiencing[1] and behaviour. It suggests both established and novel methodologies that are appropriate to match the properties of the particular phenomena studied and that allow researchers to develop comprehensive taxonomies of individual-specific variations in these phenomena.

The third article (Uher 2014c) builds on these elaborations and explores the theoretical interpretations of the thus-obtained taxonomic models, constructs and data regarding the phenomena that these represent. It reveals 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. Substantiating concerns that have been voiced repeatedly, the third article shows that previous taxonomic models have largely failed to empirically represent individual experiencing, behaviour, functioning and development. It presents novel insights about the methodologies that are required for comprehensively exploring "personality" differences as well as basic processes of "personality" functioning and development and about the various kinds of taxonomic models that are therefore required and that have yet to be developed. Closing this trilogy, the article derives some meta-desiderata for future research on individuals and on "personality".

I) The Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm): Relevant foundations for scrutinising taxonomic "personality" research

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

The nature of this paradigm: Considering the limitations of human minds

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

The TPS-Paradigm explicitly considers the fact that all research is conducted by humans. Research on individuals encounters intricate challenges because researchers themselves are always individuals with their own particular viewpoints and abilities that determine and limit their interests in and opportunities for exploring the "world". This entails particular risks for anthropo-, ethno- and ego-centric biases (Uher 2014a) and for various fallacies of the human mind, such as when researchers tend to oversimplify complexity

[1] For the term *experiencing,* see the section on The Psyche in part I below.
[2] To appear in the *Annals of Theoretical Psychology, vols. 12, 13*.

(Royce 1891) or to reify linguistic abstractions (Whitehead 1929). Biases and fallacies occur on both metatheoretical and methodological levels.

Metatheory refers to researchers' basic assumptions about how real phenomena can be reduced to scientific phenomena and hence, what can be considered to be facts in the field and how the thus-defined facts can be theoretically analysed and interpreted. It also refers 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. *Methodology* refers to the ways (i.e., approaches) in which these questions are tackled and to the techniques (i.e., methods) that researchers therefore use. Metatheory and methodology are derived from and presuppose philosophical presuppositions.

Philosophical presuppositions are rational structures that are required for any scientific system to function and necessarily originate from outside the particular system that is build upon them. Therefore, they cannot be rationally justified within the given system for which they are formulated (Gödel 1931) and are also called absolute presuppositions (Collingwood 1940). Scientists exploring individuals face additional challenges because the presuppositions that they make are not independent of their objects of research. Therefore, "objectivity" can be only *intersubjectivity* and intersubjective consensus can be reached only on the basis of shared philosophical presuppositions. The explicit formulation and critical discussion of such presuppositions are thus essential for analysing theories and methodologies (Fahrenberg 2013; Uher 2011a) as done in this trilogy (Uher 2014a, c).

The following specifies some absolute presuppositions that the TPS-Paradigm makes about research on individuals and that are relevant for the analyses presented in this article. Some researchers may share these presuppositions completely or partially; others may not. Those who do not agree must develop and use metatheories and methodologies other than the ones that are analysed in this trilogy, thus precluding direct comparisons. Making the presuppositions explicit is aimed at revealing possible differences in the presuppositions that are made in the field and at enabling comparisons and controversial discussions between different lines of research that are based on the *same* or similar absolute presuppositions as made in the TPS-Paradigm (Uher 2013, Desideratum 1g).

Philosophical presuppositions about the various kinds of phenomena explored in individuals

The notion of phenomena and basic and composite kinds of phenomena

The TPS-Paradigm for Research on Individuals conceives of anything that is perceptible or conceivable by humans as a *phenomenon*, unlike various historical concepts (e.g., Kant 1781; see Uher 2014a in this trilogy). It differentiates *various kinds* of phenomena that are frequently studied as "personality"[3] and/or in relation to it (for details, see Uher 2013). Specifically, the phenomena of morphology, physiology, behaviour and the psyche are differentiated from one another; they are conceived of as *basic kinds of phenomena* because they are inseparable from the healthy and intact body of the individual under study. The phenomena of semiotic representations, artificially modified outer appearance and contexts ("environment") are also differentiated, but are conceived of as *composite kinds of phenomena* because they each comprise several different kinds of phenomena, among them at least one basic kind of phenomenon, which is thus inseparable (in the sense stated) from the body of the individual studied. Composite kinds of phenomena may also comprise external physical phenomena that are independent from the body of the studied individual (see below).

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

The various kinds of phenomena are differentiated from one another on the basis of their particular constellation of forms that can be conceived for them with regard to three metatheoretical properties: *1)* spatial location in relation to the material entity of the individual

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

under study, *2)* temporal extension and *3)* physicality versus "non-physicality". Importantly, the considerations made in the TPS-Paradigm generally refer to the dimensions of everyday life experiences (i.e., spatial dimensions comparable to the human bodies, temporal dimensions of the international time standard) rather than to the dimensions of atoms or the outer space as considered in specific fields of research (e.g., chemistry, quantum physics, astronomy). But regardless of this, the three metatheoretical properties are conceived on levels of abstraction that are commonly not considered in either everyday life or science, likely because they do not appear to be of primary concern for the specific research questions pursued in the field.

The TPS-Paradigm considers these particular properties because their particular constellation in each given kind of phenomenon *unequivocally* determines its perceptibility by individuals in everyday life, and thus also its accessibility by scientific investigation (e.g., using invasive and technical methods). Thus, these properties also determine the accessibility of many further properties that can be perceived in the phenomena under study or can be inferred from them and that are mostly in the focus of research. In metatheoretical regards, the specific and different constellations of forms that can be conceived with regard to these three metatheoretical properties 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. Insufficient consideration of these frames of reference may therefore entail mismatches with the methodologies that are applied for investigations (cf. phenomenon-methodology matching below and Uher 2014a, c in this trilogy).

1) Spatial location in relation to the individual's body (i.e., *internality and/or externality*) refers to the individual conceived as material physical entity, rather than as subjectively, psychologically and/or socially constructed entity. Moreover, externality and/or internality refers to the *particular phenomenon under study* (e.g., behaviour) rather than to a particular theoretical focus that researchers can take on individuals or to the perspectives that individuals can generally take on themselves and on others; this differs fundamentally from previous concepts used in the field (see Uher 2014a in this trilogy). Instead, the TPS-Paradigm considers the *spatial location of the phenomenon under study in relation to the material entity of the individual under study* because this location determines the direct perceptibility of the given phenomenon by individuals and thus also by researchers. In everyday life conditions, individuals can directly perceive phenomena that are external to other individuals' bodies (e.g., hair, accessories, vegetation, buildings), but they cannot directly perceive phenomena that are internal to others' (intact) bodies (e.g., lungs, arteries; with a few exceptions under particular conditions, e.g., tongue). Internal phenomena can be made perceptible by using invasive and technical methods (e.g., surgery, MRI), but only if these phenomena are physical (see below).

2) Temporal extension refers to the temporal persistence of the phenomenon under study. This property is considered because, to be perceptible, a phenomenon must be present in the given moments of investigation. Some phenomena are temporally more extended (e.g., individuals' physiognomy, monuments), but others are strictly bound to the present moment in time and may also fluctuate, thus complicating their perception (e.g., eye blinks, speech).

3) Physicality versus "non-physicality"[4], as terms, refer to the science of physics in the TPS-Paradigm rather than to corporality, which cannot be conceived for immaterial physical phenomena in and of themselves. Physicality denotes that material physical phenomena feature *spatial units* that are rather constant and

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

identically repeatable to a considerable extent (e.g., molecules, cells, bricks, plant leafs, book pages). Spatial units occurring in the material physical phenomena can be used to identify units in immaterial physical phenomena that do not feature spatial units in and of themselves (e.g., gravity, behaviours) but that are systematically related to material physical phenomena (e.g., the individual's body). *"Non-physicality"*, by contrast, denotes the immaterial properties of the phenomena of the psyche that, in and of themselves, lack not only spatial units or spatial dimensions in general (Kant 1798) but also systematic relations to the physical phenomena by which they are accompanied (e.g., brain physiology; Fahrenberg 2008a, 2013; Wundt 1894).

General methodological implications derived from the philosophical presuppositions

Implications derived from the phenomena's temporal properties: Nunc-ipsum methods

The TPS-Paradigm derives a first category of methods on the basis of the temporal extension of the phenomena under study. Specifically, phenomena occurring only briefly can be perceived by individuals and thus be recorded by researchers only in the particular moments in which their events occur (e.g., facial expressions, electrical activity of neurons). Methods enabling the *real-time recording of momentary events* are referred to as *nunc-ipsum methods* (from Latin *nunc ipsum* for at this very instant) in the TPS-Paradigm. This category comprises diverse methods that each target at a specific kind of phenomenon (e.g., behaviour, physiology) and that often involve technical methods to facilitate the recording of momentary events (e.g., video camera; electroencephalograph, EEG; Uher 2013, Desiderata 1c, 2a, 7c).

Implications derived from the phenomena's spatial properties: Extroquestive and introquestive methods

The phenomena's spatial location in relation to the individuals' intact body and their physicality versus "non-physicality" are used to derive and define two further categories of methods. *Extroquestive methods* (from the Latin *extro* for beyond, outside) are defined as all procedures for studying phenomena that individuals can *directly perceive as being located external to their bodies* and that can therefore *be directly perceived by multiple individuals*—thus, only physical phenomena (e.g., individuals' physiognomy, texts, trees). Using the same extroquestive ways of exploration, individuals can also directly perceive many physical phenomena of their own bodies both external (e.g., legs) and, under special conditions (e.g., injuries), even internal (e.g., blood, muscle tissue). The crucial point is that physical phenomena of individuals' bodies are directly perceptible or can be made directly perceptible by multiple individuals, both external phenomena and, under particular conditions, also internal physical phenomena (e.g., leg muscles and arteries by using invasive and technical methods such as open muscle biopsy or Doppler ultrasound).

Introquestive methods (from the Latin *intro* for in, within), by contrast, are defined as all procedures for studying phenomena that can be *directly perceived only from within the individual him- or herself and that are, in principle, not directly perceptible by any other individual under all possible conditions*—thus, only psychical[5] phenomena. Psychical phenomena (e.g., emotions, thoughts) cannot be directly perceived by any other individual (Kant 1786; Locke 1689; Pauli 1927; Uher 2013, 2014d); they are generally inaccessible by extroquestive methods, no matter what invasive or technically advanced methods may be used. This entails intricate challenges because the researchers themselves cannot directly perceive the particular phenomena under study but have to rely on the studied individuals' externalisations, especially self-reports. Therefore, the TPS-Paradigm broadly refers to all methods of self-observation and self-report (e.g., questionnaires) as introquestive methods.

[5] The term psychical as opposed to psychological is explained below (see section on The Psyche in part I).

The ending (extro- and intro)–*questive* or –*question* (from the Latin *quaerere* for to seek, ask, enquire) implies the involvement of sensory perceptions of all kinds (e.g., visual, acoustic, olfactory) and of some active exploration on the part of the individuals who perceive the phenomena under study. The TPS-Paradigm introduces the terms extroquestion and introquestion to differentiate these particular methods from methods of extro*spection* and intro*spection*. Extro- and introspection are commonly defined and differentiated from one another on the basis of the per*spective* that the individuals under study take on themselves versus on other individuals or on things (cf., Boring 1953; Butler 2013; James 1890; Locke 1689). But individuals can always perceive and conceive of both their own psychical phenomena and external phenomena—they can extrospect and introspect at the same time. In individuals' immediate experiential reality, both perspectives are always interwoven—in the individuals being studied and in the researchers (cf. Kant 1781; Wundt 1896). Hence, as methods, extrospection and introspection cannot be clearly differentiated from one another (for details, see Uher 2014a in this trilogy).

Introquestion and extroquestion, by contrast, are defined and differentiated from one another on the basis of *a) the particular phenomena under study*, considering that various other phenomena are likely present in the given investigation as well and that all individuals involved can introspect and extrospect at the same time, and of *b) the particular persons who perceive the phenomena under study and who provide first representations of information (i.e., conversions)* from the studied phenomena as perceived and conceived by them in particular external physical phenomena used as signs (e.g., spoken words).

The elementary problem of phenomenon-methodology matching

The conversion of information between different kinds of phenomena is elementary to data generation in all sciences (cf. Wundt 1896) and also to communication in everyday life (Uher 2014d). In the TPS-Paradigm, 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. In research on individuals, philosophy-of-science foundations for conversions of information are particularly important because the data generation in this field has to rely largely on human individuals (e.g., researchers, observers, the individuals under study) who convert information from their perceptions and conceptions of the phenomena under study into information in external physical phenomena (e.g., materials like clay tablets, laptops) that can be used as *signs* (e.g., cuneiform script, lexically encoded numerals or variables) and that are *explored in lieu of the actual phenomena under study* (e.g., individuals' morphology, behaviours, spoken language) using methods of scientific analysis (e.g., statistical or content analysis). Opportunities for technical conversions for generating data, as are possible in the natural sciences to a considerable extent, are fairly limited (for details, see Uher 2014c in this trilogy).

The TPS-Paradigm specifies that the elementary problem of *phenomenon-methodology matching* arises from the different metatheoretical properties that can be conceived for the phenomena under study and for the phenomena used for their semiotic representation in a given methodology. Generally, between kinds of phenomena for which different metatheoretical properties can be conceived, isomorphisms can only be low, if not completely absent. Low isomorphisms between the phenomena under study and the phenomena used as signs in a particular methodology inevitably entail a loss of information (therefore, this is called conversion rather than translation or transcription). If the loss of relevant information is significant, which may be neither obvious nor known a priori, then the particular semiotic system cannot appropriately represent the particular phenomena under study. Insufficient consideration of differences in their frames of reference therefore entail mismatches between the phenomenon studied and the methodology used. Consequently, the methodology used to generate "data" unequivocally determines whether or not a particular kind of phenomenon can be appropriately represented in these "data", thus enabling or hindering its scientific exploration (for details and examples of mismatches from taxonomic "personality" research see part II below and Uher 2014a and 2014c in this trilogy).

Complete metatheoretical commensurability

The TPS-Paradigm elaborates clear-cut criteria that researchers can use to decide whether or not a particular methodology matches their particular phenomena of interest (Uher 2013, Desiderata 1a, 1d, 7). Specifically, it explores the possibilities and constraints that occur in conversions of information between particular kinds of phenomena. These explorations are made on the basis of the three metatheoretical properties that it conceives and of properties that are intersubjectively ascribed to the signs used (e.g., mathematical properties) and that are related to at least one of these three metatheoretical properties (e.g., numerals representing nominal, ordinal or metric data; see below). The TPS-Paradigm conceives that the particular constellation of forms that a given kind of phenomenon takes with regard to the three metatheoretical properties establishes the phenomenon's frame of reference. If the same constellation can be conceived for different kinds of phenomena, isomorphisms between their events can be high. Then their frames of reference are considered to be *completely metatheoretically commensurable* (from the Latin *commensurabilis* for having a common measure). Complete metatheoretical commensurability enables *appropriate* conversions of information between different phenomena, such as between the phenomena under study and the physical phenomena used as signs in the process of data generation (see part II below). It may also allow for conversions of information in mere technical ways without involving any direct human perception of the studied phenomena in and of themselves (e.g., automated haematology analyser perform complete blood counts; see Uher 2014c in this trilogy).

Consent-based commensurability: Explicit encoding schemes and basic conversion principles

For many kinds of phenomena explored in individuals (e.g., behavioural and psychical phenomena), frames of reference can be conceived that are not completely metatheoretically commensurable to the frames of reference that can be conceived for the phenomena commonly used as signs in research, which are extroquestively accessible, temporally extended and material physical such as behavioural variables, numerals taken down on paper or in digitised[6] form. When only partial or even no metatheoretical commensurability can be assumed, commensurability between their frames of reference must be established on the basis of decisions. These decisions are made by the persons who provide the first conversions of information from their perceptions and conceptions of the phenomena under study in semiotically encoded information. When these decisions are made explicit and specified in intersubjective agreement, this is referred to as *consent-based commensurability* in the TPS-Paradigm. For enabling scientific exploration, information must be converted systematically and according to explicitly defined assignment rules (e.g., coding schemes); this is (commonly) referred to as *encoding* (also coding).

Encoding schemes specify the particular intersubjective agreements that are made in a given study about which particular pieces of information about the phenomena and events under study as perceived and conceived by human individuals (e.g., observers) can be demarcated and categorised in what ways and how the thus defined units can be represented through which particular signs (e.g., behavioural variables, numerals). These issues of operational definition are well known and frequently discussed in all areas of research, much in contrast to the preceding metatheoretical and methodological steps of data generations, which should therefore not be confused with ideas of operationalism (for details, see Uher 2014a; examples from taxonomic "personality" research are explored in part II below). The TPS-Paradigm extends the previous concepts of operational definition by elaborating the particular issues that researchers must explicitly address in their encoding schemes and by specifying these issues in three basic conversion principles (Uher 2013, Desiderata 1a, 1d, 1f, 7c).

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

The *basic conversion principles* specify particular constraints that may occur for conversions of information between kinds of phenomena that differ from one another in their particular 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 involved have only brief temporal extensions (i.e., are momentary) and, in particular, if one or even both of them 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 involved feature 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 entails fundamental challenges for explorations of phenomena of the psyche and may also affect explorations of individuals' inner morphology and physiology. Conversion Principles 2 and 3 entail challenges in particular for explorations of behaviours and the psyche (as explored in this part and in part II below and in Uher 2014a and 2014c in this trilogy). Explicit definitions and descriptions of the particular phenomena and events under study are essential prerequisites for scientific quantification.

Scientific quantification: Philosophy-of-science foundations

Many researchers aim to quantify their particular phenomena of interest; researchers exploring individuals and their "personality" are no exception from this. Controversies arose on the appropriateness of quantifications (i.e., phenomenon-methodology matching) especially with regard to psychical phenomena (cf. the controversy on quantitative versus qualitative methodologies, explored in Uher 2014a in this trilogy) and with regard to individuals' "personality" (cf. the controversy on nomothetic versus ideographic approaches, explored in Uher 2014c in this trilogy). But clear-cut criteria that researchers can use to decide whether or not particular kinds of phenomena can be quantified at all and what particular methods enable quantifications of a particular kind of phenomenon have been missing so far. The lack of such criteria may have contributed to the widespread creation of numerical data without any specification of how these data are actually generated and what particular phenomena and events they actually represent, as is the case with standardised questionnaire methods (explored in detail in part II below and in 2014c in this trilogy).

To provide such criteria, the TPS-Paradigm elaborates philosophy-of-science foundations for *scientific* quantifications of the phenomena explored in individuals (cf. Uher 2013, Desiderata 1d, 1f, 1g, 7c). Specifically, it derives two elementary requirements from the three metatheoretical properties that it considers and from established concepts of *set theory* and *algebra* (JCGM 2008). Accordingly, researchers must first specify the sets of the elements to be quantified in the phenomena under study (i.e., the *set-theoretic requirement* of scientific quantification). These sets of elements must be intersubjectively demarcated, categorised and lexically described in the explicit encoding schemes that researchers establish for their particular study. Second, researchers must directly compare the elements thus-defined with designated fixed physical standards of measurement to express their ratio as a real number (i.e., the *algebraic requirement* of scientific quantification). The TPS-Paradigm refers to numerical data in which these two requirements are fulfilled as *scientific* quantifications as opposed to (subjective) quantifications in which they are not fulfilled. Importantly, these requirements must be fulfilled *with regard to the phenomena under study*, not only with regard to the phenomena used for their semiotic representation given that their frames of reference may be metatheoretically commensurable only partially or not at all. This is not always well considered in research on individuals as the analyses presented in this trilogy show (details and examples are explored in part II below).

The TPS-Paradigm emphasises that the ability to meet the set-theoretic and the algebraic requirements of scientific quantification is unequivocally determined by the

particular constellation of the three metatheoretical properties that can be conceived for each given kind of phenomenon. Specifically, the availability of rather constant *spatial units* that are identically repeatable to a considerable extent (e.g., molecules, cells, written words), temporally extended and extroquestively accessible, thus enabling multiple individuals to perceive *one and the same event*, helps in creating an intersubjective consensus on how to demarcate and categorise events and to explicitly define the sets of elements to be quantified in the phenomena under study (e.g., what is considered to be one [*n* = 1] molecule of glucose, one [*n* = 1] red blood cell, one [*n* = 1] word). Fulfilling this set-theoretic requirement is complicated in phenomena featuring units that vary in their spatial and temporal extensions. To cover this variability, definitions of events must be much broader than definitions of rather constant events (e.g., what is considered to be one [*n* = 1] step given that steps can be small or long and carried out quickly or slowly; see section on Behaviour in part I below). Particular intricacies are entailed for attempts to explicitly define the sets of elements to be quantified in phenomena that feature no spatial units at all (e.g., what is one [*n* = 1] thought?) and that cannot be directly perceived by multiple individuals, thus that are accessible only using introquestion (i.e., psychical phenomena; see below; for details see Uher 2014a in this trilogy).

The availability of spatial units that are rather constant and extroquestively accessible also enables direct comparisons of the defined sets of elements of the phenomena under study with designated spatial standards of measurement (e.g., of distance, volume such as meter, cubic meter) to express their ratio as a real number. But in phenomena that are momentary and fluctuating phenomena and that feature units of variable spatial and temporal extension such direct comparisons are complicated in both everyday life and in many research settings (e.g., observations of social behaviour). To enable researchers to meet the algebraic requirement of scientific quantification for such kinds of phenomena as well, the TPS-Paradigm introduces the concept of *time-relative probabilities*, which, unlike most scientific measurements, relies on designated standards of *physical time*, rather than as of space. Specifically, the occurrences of the explicitly defined sets of elements are directly related to the defined periods of time during which they were recorded, thus enabling scientific and even *ratio-scaled* quantifications. Therefore and because in momentary and fluctuating phenomena the measurements thus-obtained can be only *probabilistic*, they are referred to as time-relative probabilities (for examples, see below, Uher 2013, 2014a and 2014c in this trilogy). This concept is particularly important for quantifying “personality”.

“Personality” as individual-specificity: A metatheoretical definition and general methodological implications

The TPS-Paradigm conceives of “personality” as *individual-specific patterns* in the occurrences of events. To be specific to an individual, the patterns must differ between individuals (i.e., be *differential*) in ways that are stable for at least some amount of time (i.e., be *temporally stable*; Uher 2011a, 2013). The TPS-Paradigm highlights that *individual-specificity cannot be directly perceived* because it denotes temporal, differential and, in momentary and fluctuating phenomena, also probabilistic patterns. Hence, to identify individual-specificity, occurrences of defined events must be registered repeatedly and accumulated over time. The scientific quantifications thus-obtained (e.g., time-relative probabilities) must then be compared *post-hoc* between individuals to identify differential patterns. These differential patterns must be shown to be stable across time periods longer than those in which the measurements were first ascertained and in ways that are considered to be meaningful (e.g., defined by the strength of statistical correlations over specified time periods (for details, see Uher 2013, Desiderata 1d, 2a, 2b; Uher et al. 2013a). Thus, individual-specificity is an abstract idea, a construct denoting particular constellations of patterns in the occurrences of events.

This metatheoretical definition, together with the philosophy-of-science foundations of phenomenon-methodology matching, of scientific quantifications and the concept of time-relative probabilities, allow researchers to explore individual-specificity in *average* occurrences of defined events but also in their *variabilities* and *ranges* (especially in

momentary and fluctuating phenomena). These concepts also enable, amongst others, explorations of individual-specificity across different time periods (e.g., within-individual stability), across different situations (e.g., behaviour-situation profiles) or across different kinds of events (e.g., behavioural profiles) or different kinds of phenomena (e.g., "personality" profiles; Uher, Addessi & Visalberghi 2013a). Such analyses are important to comprehensively explore both *compositional structures* of individual-specificity and *process structures* of how the compositional elements identified function together in the given individual in the given moment (i.e., microgenetically) and over time (i.e., ontogenetically). The TPS-Paradigm explores basic epistemological principles and provides an elaborated methodology for enabling comprehensive taxonomic explorations of *both* kinds of structures (i.e., the Hourglass-Shape Methodology, presented in 2014c in this trilogy; cf. Uher 2013, Desiderata 1e, 8). The elaborations of the present article focus on the primary identification of individual-specificity, which is basic to all kinds of explorations.

Importantly, individual-specificity is constructed in various kinds of phenomena—not only by scientists but primarily by lay people in everyday life as explored below. Common definitions of "personality" refer to only some of the various kinds of phenomena differentiated in the TPS-Paradigm (for details, see Uher 2013). But decisions about which kinds of phenomena to consider—and which ones to discard—can be made only on the basis of philosophical presuppositions. The TPS-Paradigm, given its transdisciplinary scope, refrains from making such presuppositions and conceives of "personality" as individual-specific patterns in *all* of the various kinds of phenomena considered by researchers of individuals and of "personality". The aim is to provide a coherent and comprehensive metatheoretical and methodological framework that scientists can use to explore their particular kinds of phenomena of interest and that is helpful for establishing links between lines of research that each explore different kinds of phenomena (cf. Uher 2013, Desiderata 3, 6, 7, 8).

The following defines each of the various kinds of phenomena explored in individuals and specifies the particular constellations of the metatheoretical properties that the TPS-Paradigm conceives for them. Building on this, specific methodological requirements for exploring individual-specific patterns are elaborated for each given kind of phenomenon (cf. Uher 2013, Desiderata 1a, 1d, 1g, 7).

Morphology and physiology: Metatheoretical properties and methodological requirements for exploring individual-specificity

Morphology[7] denotes living organisms' bodily structures and their constituting parts. They can be internal (e.g., muscles, ligaments) and external (e.g., nails) to the bodies of healthy and intact individuals; some phenomena can also be both (e.g., hair, outer skin). Morphological phenomena are temporally extended, thus not bound to the immediate moment. They are material physical, thus featuring spatial units that are identically repeatable to a considerable extent (e.g., body parts, organs, cells).

Physiology[8] denotes the chemical and physical functioning of these structures. They are also physical phenomena but not necessarily material (e.g., electric potentials). Physiological phenomena are primarily internal to individuals' bodies (e.g., neurotransmitters), but some can also become external (e.g., urine). Many physiological phenomena are temporally more extended (e.g., growth hormones), but some are of comparably brief temporal extension (e.g., insulin secretion) and others are strictly momentary (e.g., action potentials of muscles). All physiological phenomena are physical, though not necessarily material in and of themselves (e.g., heat), but spatial units can be identified through the morphological phenomena in which they occur.

This constellation of metatheoretical properties enables multiple individuals to directly perceive *one and the same event*, thus extroquestive methods. In individuals' outer morphology (e.g., their physique), occurrences of defined events can be perceived rather

[7] In the TPS-Paradigm, the terms morphology and physiology denote the organismal structures and functions, in and of themselves, rather than the scientific disciplines that explore these phenomena.

directly, whereas in individuals' inner morphology (e.g., brain structures) and physiology (e.g., immune system), this requires invasive and mostly technical methods. The extroquestive accessibility and the availability of rather constant spatial units help researchers to achieve an intersubjective consensus on how to demarcate, describe and categorise the sets of events to be explored in the phenomena under study. This also enables direct comparisons of the thus-defined events with designated physical standards of measurement; thus fulfilling both requirements of scientific quantification. To evidence *individual-specificity*, scientifically quantified *individual patterns* are compared (mostly after obtaining them, thus post-hoc) between individuals to identify differential patterns that must then be shown to be temporally stable to some extent.

Behaviours: Metatheoretical properties and methodological requirements for exploring individual-specificity

The TPS-Paradigm defines *behaviours* as the "external changes or activities of living organisms that are functionally mediated[8] by other external phenomena (Millikan 1993) in the present moment" (Uher 2013; Uher et al. 2013a, Uher, Werner & Gosselt 2013b). Thus, not all external changes or activities are behaviours (e.g., mere chemical by-products such as heat) and behaviours are not just movements (e.g., freezing behaviour in prey animals). Functional externalisations are behaviours only if their functions have *reference to* other external phenomena or to relations to them (Millikan 1993). Importantly, neither mental activities nor physiological responses are conceived of as behaviours; this concept differs fundamentally from those of behaviouristic paradigms (e.g., Skinner 1957). The TPS-Paradigm also refrains from making a priori assumptions about the behaviours' potential causation in specific kinds of phenomena as implied by concepts of "goal-directed" actions or behavioural "responses" in some cognitivist paradigms. Instead, it explicitly considers the possibility that behavioural events may be causally interrelated with *all* concurrent events both internal and external to the individual (cf. contextual phenomena, below). In addition, the TPS-Paradigm also considers the possibility that the same external change or activity can have different functions in different external settings (cf. multi-contextuality, Uher 2014a and 2014c in this trilogy) and that these functionalities can also vary intra- and inter-individually. For exploring behaviours, the TPS-Paradigm therefore provides *contextualised methodologies* that allow researchers to specify the particular behavioural situation in which defined behaviours occurred (see part I and II below; Uher 2013, Desideratum 2c; for empirical examples, see Uher et al. 2013b; cf. similarly Uher 2011a; Wright & Zakriski 2003).

Hence, behaviours are phenomena that are located entirely external to individuals' bodies. They are physical phenomena but immaterial in and of themselves (e.g., movements). Rather constant spatial units suggesting clear demarcations of single events are largely absent, but demarcations can be made on the basis of the material properties of the individuals' bodies to which behaviours (e.g., walking) are bound (e.g., legs) and of other external material phenomena with which behaviours are interrelated (e.g., ground surface). But unlike other immaterial physical phenomena, the units that can be identified in this way often vary in their spatial and temporal extensions (e.g., individuals can take small or large steps and can carry out each step at variable speed). But the morphological constraints of individuals' bodies (e.g., length of legs) entail that the thus-identified units (e.g., steps) are identically repeatable at least to some extent.

These metatheoretical properties of behaviours enable multiple individuals to directly perceive one and the same event, thus enabling extroquestive methods. This, in turn, helps researchers to achieve an intersubjective consensus on how to demarcate, describe and categorise events to be explored in the behavioural phenomena under study. But joint perceptions of one and the same event are complicated because behaviours are bound to the immediate moment and often fluctuate. In the continuous and dynamic flow of behaviours, events can be perceived and thus be recorded only *while* they are still ongoing

[8] 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).

using nunc-ipsum methods. However, the physicality of behaviours enables technical means to reduce these constraints (e.g., physical activity tracker and ambulatory monitoring, Fahrenberg, Myrtek, Pawlik, & Perrez 2007; Mehl & Conner 2012; video-based behavioural coding, Uher et al. 2013b; see Uher 2014c in this trilogy).

The momentariness of behaviours also complicates direct comparisons of defined events with designated spatial standards of measurement (e.g., yard stick) in most everyday life conditions and also in many research settings (e.g., observations of social behaviour). But the occurrences of defined events can be directly compared with *temporal* standards of measurement using the concept of time-relative probabilities. Specifically, nunc-ipsum methods generate log files of (non-)occurrences of defined events that are then accumulated over repeated occasions. As behaviours are fluctuating, the measurements thus-obtained can be only *probabilistic*. By relating them to the time periods in which they were recorded, scientific quantifications in terms of ratio-scaled time-relative probabilities are obtained for individual patterns. To identify individual-specificity, these individual patterns are then compared *post-hoc* (i.e., after completion of data collection) between individuals to identify differential patterns that are then explored for stability over some amount of time (for details, see Uher 2013, pp. 6-10, cf. Desiderata 2a, 2b; for comprehensive empirical demonstrations, see Uher et al. 2013a). Importantly, both *individual patterns* and *individual-specific patterns* can be scientifically quantified only through stepwise analyses of the data collected using nunc-ipsum methods. *Direct scientific quantifications of either individual patterns or individual-specificity in the occurrences of behavioural events in the primary data that are generated during behavioural observations are not possible*.

Behaviour-rating methods, by contrast, require observers to directly quantify behavioural events shown by individuals. This means that observers must compare the event to be quantified with events of the same kind that, however, have already ceased to be because behaviours are momentary and fluctuating. Therefore, observers can *compare their current perceptions of behavioural events only with memorised past perceptions* of such events that they reconstruct during this rating task. But memories represent past perceptions in inherently processed, abstracted and integrated forms. The particular sets of elements that are compared with one another remain unknown and comparisons with designated physical standards are not possible, thus precluding scientific quantification of *individual patterns*. Memory-based judgements of habitual behaviours, in which individuals are asked to directly quantify *individual-specific patterns* (as in some “personality” questionnaires), face the same problems. These methods explore people’s psychical constructions of individual-specificity, which are different kinds of phenomena than behaviours.

The psyche: Metatheoretical properties and methodological requirements for exploring individual-specificity

The *psyche* denotes the entirety of the phenomena of the immediate experiential reality both conscious and non-conscious of living organisms (cf. Wundt 1896). In line with German-language research traditions from the 19th and 20th century, on which the TPS-Paradigm is partially built, the events and phenomena of the psyche are referred to as *psychical* rather than psycho*logical* 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 all kinds of psychical phenomena, thus not only mental but also emotional, volitional and other psychical phenomena (Wundt 1896).

Psychical phenomena are entirely internal and directly accessible only to the individual itself using introquestion. One and the same event can never be perceived by multiple individuals and direct comparisons of events between individuals are precluded (Kant 1786; Locke 1689; Pauli 1927; Weber 1949). On the basis of their temporal extension, the TPS-Paradigm differentiates experiencings (Erleben) from experiences (Erfahrungen). *Experiencings* are strictly bound to the immediate moment and are highly fluctuating (Pauli 1927; Stern 1924; Uher 2013; Valsiner 1998). Experiencings that are processed, abstracted and memorised become experiences that are interconnected with other experiences and

integrated into the individual's psychical system, which thereby continuously changes and develops (Le Poidevin 2011; Valsiner 2012). *Experiences* are the *a posteriori* of experiencings; they are *memorised psychical resultants* that the individuals retains of past experiencings in processed forms and that are therefore temporally more extended (e.g., psychical representations).

Importantly, memorised psychical resultants cannot be directly accessed; they can only be retrieved into an individual's experiencings. But a revived experiencing is never merely identically repeated; it is always reconstructed anew in the context of all other concurrent events internal and external to the individual (cf. multi-contextuality, Uher 2014a and 2014c in this trilogy; Bartlett 1932; Schacter & Addis 2007; Walach 2013) before it is reintegrated again into the hitherto reached structures of the individual's psychical system that thereby continuously changes and develops (Le Poidevin 2011; Valsiner 2012). The TPS-Paradigm differentiates on metatheoretical levels two different kinds of structures of memorised psychical resultants. *Compositional structures* refer to the contents of individuals' experiential reality, such as psychical representations of past experiences, abstracted ideas, beliefs and knowledge. *Process structures* refer to basic patterns in the processing of these contents, such as capacities for abstraction, [re]construction, memory span, self-regulation and self-organisation (details are explored in Uher 2014a and especially in 2014c in this trilogy).

The momentariness of experiencings actually requires methods of *nunc-ipsum introquestion*. But attention and externalisation inevitably introduce changes to their course of events, thus enabling the study of only brief experiencings (e.g., sensory perceptions; Wundt 1904). In *retro-introquestion*, individuals are therefore asked to reconstruct the experiencings that occurred during a specified task *ex post facto,* thus without disturbing them (e.g., Bühler 1907; Rosenbaum & Valsiner 2011). To facilitate accurate reconstructions through the activation of episodic memory, the retrieval situations should be ecologically valid and representative of the situations in which the experiencings occurred. Suitable methods are, for example, subjective evidence-based ethnography (SEBE; Lahlou 2011) and microgenetic methods (Diriwächter & Valsiner 2008; Wagoner 2009). As retrieval is susceptible to various fallacies of memory (Schacter 1999), temporal proximity enabling *short-term memory retrieval* is essential for retro-introquestive methods. Necessarily, all methods of introquestion inherently rely on the studied individuals' memorisations and reconstructions of their psychical phenomena. The pertinent abilities of the individuals under study cannot be validated by methods that are independent of these individuals because nobody else can perceive the phenomena under study. This is a fundamental problem inherent to all explorations of psychical phenomena (cf. Uher 2014d) and thus to all methods of introquestion no matter whether they are guided or non-guided, highly structured and standardised or not (e.g., standardised self-report questionnaires, interviews; cf. Uher 2013, Desiderata 7a-c).

Self-report methods (e.g., "personality" questionnaires) in which individuals are asked to report *habitual* experiencings rely on *long-term memory-based introquestion*. Given that past experiencings have already ceased to be, such tasks require individuals to reconstruct the psychical representations that they have developed from and about their past experiencings. Thus, although self-reports are reconstructed in the individual's experiencings in the given moments and particular contexts of enquiry, the self-reported contents primarily reflect the individual's memorised psychical representations of *outcomes of his or her processing of experiencings in the past* (i.e., of own experiences) in terms of, for example, self-knowledge or personal narratives but not those past experiencings in and of themselves (cf. Uher 2013, Desideratum 1e).

The TPS-Paradigm conceives of psychical phenomena as "non-physical", thus as immaterial phenomena that lack spatial units and spatial dimensions in general (Kant 1798) and that also lack systematic relations to the material and immaterial physical phenomena by which they are accompanied (e.g., brain morphology and physiology; Fahrenberg 2008a, 2013; Wundt 1894). Therefore, the entirety of psychical phenomena cannot be conceived of as a material entity that could be directly perceived as is possible for individuals' bodies.

Notions of “the psyche” in the TPS-Paradigm do not and cannot imply reification as a concrete entity; the psyche can only be constructed mentally as an entity.

These “non-physical” properties entail particular intricacies for research methodologies, especially for attempts to scientifically quantify psychical phenomena. Specifically, given their non-spatial properties, psychical phenomena do not offer any point of reference that the introquesting individual 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. Psychical events can be demarcated only by mere thought, but the mentally demarcated elements cannot be kept isolated for enabling reliable and systematic comparisons and categorisations (Kant 1786). Beyond nominal or ordinal comparisons between events of experiencings that occur in the same or in successive moments (e.g., sensory perceptions, Wundt 1904), individuals can *compare their ongoing experiencings only with memories of past experiencings*. Thus, the particular past *events* from which memories were once abstracted and that are being reconstructed in the given moment of enquiry cannot be specified, thus failing to fulfil the set-theoretic requirements for scientific quantification. This also precludes direct comparisons with spatial standards of measurement (e.g., metric measurements). Thus, both set-theoretic and algebraic requirements of scientific quantification cannot be fulfilled for psychical phenomena *in and of themselves*. This precludes *scientific quantifications* of single psychical events (e.g., an emotional event), of *individual patterns* and of *individual-specific patterns* in psychical phenomena in and of themselves (e.g., an individual’s emotionality) as often enquired about by “personality” questionnaires (as explained in part I below and in Uher 2014a and 2014c in this trilogy; cf. Levine 2003; Loftus 1996; Schrödinger 1958; Toomela 2008, 2011; Weber 1949).

However, given that individuals, as living organisms, are self-organising and thus self-referential to a considerable extent (for details, see Uher 2014a, c in this trilogy), the specific formations that psychical events take in any given individual are not essential. Essential is the functionality of such events—i.e., the *meaning* that they have for the given individual in his or her particular context. Demarcating and categorising these meanings is therefore solely a matter of subjective construction that can never be directly compared between individuals. Researchers cannot easily reconstruct these individually constructed meanings as they can rely only on the studied individuals’ *external*isations in external and thus physical phenomena that are perceptible by others (e.g., behaviours, behavioural and material signs; cf. Bühler 1934; Vygotsky 1934). But these externalising phenomena have different metatheoretical properties and may also have implicit structures; therefore, assumptions about isomorphisms between interrelated psychical and externalising events cannot be made, precluding straightforward inferences to the psychical phenomena under study (see Uher 2014a and 2014c in this trilogy; Moolenaar 2004; Toomela & Valsiner 2010; Uher 2013, Desiderata 7b, 7c).

Consequently, arriving at an intersubjective consensus on how to categorise subjectively demarcated and constructed meanings and how the individuals under study may externalise and encode them in semiotic representations (e.g., language; see next section) inherently requires hermeneutic-interpretive approaches (Berg & Lune 2012; Fahrenberg 2002; Gadamer 1975; Wong 2006; Wundt 1921). As nobody else than the individuals under study themselves can perceive the psychical phenomena to be explored, these individuals should ideally be involved at least in some extent to 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 as is done in qualitative research (e.g., communicative validation; Flick 2008). The studied individuals’ interpretations of results need not be accepted by researchers or be directly reflected in scientific theories. But their involvement helps researchers to become aware of and to minimise potential anthropo-, ethno- and ego-centric biases (unintentionally) introduced by the researchers themselves (Lahlou 2011; cf. Uher 2014a in this trilogy).

The metatheoretical fact that psychical phenomena *in and of themselves* cannot be scientifically quantified is often overlooked, most likely because scientific quantifications are possible for the physical phenomena (e.g., behaviours, spoken words) that are used for externalisations and from which psychical phenomena are inferred and indirectly studied. Thus at best, individual patterns and individual-specific patterns in psychical phenomena can be scientifically quantified *indirectly* by the occurrences of explicitly defined sets of *externalising events* that can be compared directly with spatial and in particular with temporal standards of measurement (e.g., overall word count, time-relative probabilities). Such methodologies underlie textual data analyses, amongst others, as explored in detail below (see part II). Importantly, the scientific quantifications thus-obtained reflect the *physical phenomena that are used to externalise and to intersubjectively encode* the psychical phenomena under study, but not these psychical phenomena in and of themselves. These quantitative results cannot be used to make *direct* inferences about the psychical phenomena under study because their frames of reference are not metatheoretically commensurable (cf. Uher 2013, Desideratum 7).

In sum, explorations of psychical phenomena, of how individuals construct meanings and of how they externalise psychical events (e.g., using semiotic representations) inevitably require selective combinations of extroquestive and quantitative approaches to study individuals' externalisations and of introquestive and hermeneutic-interpretive approaches to make inferences to the psychical phenomena under study (Fahrenberg 2008b; Uher 2014a and 2014c in this trilogy, Wong 2009). Examples of such approaches for exploring *individual patterns* and *individual-specific patterns* in psychical phenomena are detailed in part II below.

Semiotic representations: Metatheoretical properties and methodological requirements for exploring individual-specificity

To communicate the constructed meanings of their psychical events to others, individuals must *externalise* (i.e., convert) information from these meanings in external physical phenomena that others can perceive and from which these others can make adequate inferences about these meanings and psychical events. Species-specific behavioural repertoires have evolved to externalise meanings of vital importance in rather fixed (likely evolutionarily derived) ways. Meanings can also be assigned arbitrarily (and therefore in regionally varying ways) to other external bodily phenomena of individuals (e.g., movements and vocalisations) and also to phenomena that are independent of individuals' bodies and are more persistent (e.g., ink on paper). When such as*sign*ments are psychically represented by multiple individuals in socially shared ways, the particular physical events become *signs*—i.e., behavioural signs (e.g., gestures, spoken language) and material signs (e.g., written language). Signs are created to physically represent meanings (i.e., psychical phenomena) and to facilitate and enable their social co-construction in social communities (for details, see Uher 2014d).

Importantly, meanings are not inherent to the particular physical phenomena (e.g., movements, ink on paper) that are used as signs; rather, meanings are only as*sign*ed to them by particular individuals. Meanings, as psychical phenomena, are bound to the individuals who construct them. Thus, although meanings can be physicalised in material signs that are independent of individuals' bodies, *semiotic representations* are inextricably *bound to the individuals who co-construct them*. Therefore, dualistic concepts in which signs (e.g., "language") are explored separately from the individuals who develop and use these signs, such as for exploring influences of individuals' maternal language on their "personality", inherently entail circularity in exploration. *Exclusive conceptual separations are not possible*—unless the physical phenomena are considered only as such (e.g., movements, ink on paper) rather than as signs.

The TPS-Paradigm therefore conceives of semiotic representations as *composite* kinds of phenomena comprising physical phenomena that are tightly intertwined with psychical phenomena (e.g., meanings) and that cannot be understood as signs without considering these psychical phenomena. Rather, 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). These inclusive conceptual separations can be made on the basis of the three metatheoretical properties that the TPS-Paradigm considers. Thus, semiotic representations are phenomena with *heterogeneous metatheoretical properties* as they comprise both "non-physical" and physical events, both internal and external events and as they may also comprise both momentary and non-momentary events. Given these differences in metatheoretical properties and thus their frames of reference, isomorphisms between interrelated events of the different kinds of phenomena that are comprised by semiotic representations can be only low. 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.

Because meanings are bound to individuals' memories and always reconstructed anew in their experiencings, meanings continuously change and develop. But these changes in meaning need not be reflected in the physical events that are used to externalise them and that are (purposefully chosen to be) more persistent. Moreover, signs (e.g., words) implicitly reflect meanings that were co-constructed by past generations. For these reasons, signs cannot reflect the phenomena that they denote in the same ways in which individuals perceive them in a given moment (Vygotsky 1934). As meanings are not inherent to the signs (e.g., phonemes) by which they are physically represented and as they vary within and between individuals and over time, the meanings that researchers construct for particular signs (e.g., questionnaire items) need not be the same as those *fields of meanings* that the studied individuals construct for them (Rosenbaum & Valsiner 2011). *Individual patterns* and *individual-specificity* may therefore be found in the ways in which individuals use signs for externalising meanings in defined situations and time periods and in the fields of meanings that individuals construct for and assign to particular signs (e.g., questionnaire items) and to particular events and phenomena (e.g., individual behaviours) for which they develop and use particular signs. Moreover, *constructs of individual-specificity* (i.e., "personality" constructs) may be psychically represented in *socially shared* and in *individual-specific* ways. Such explorations are discussed in detail and illustrated with examples below (part II).

In sum, the composite nature of semiotic representations entails the peculiarity that their exploration requires extroquestive and quantitative approaches to study the physical phenomena that are used as signs as well as introquestive and hermeneutic-interpretive approaches to study the psychical phenomena (e.g., meanings) that are ascribed to these signs. These different kinds of approaches must be targeted toward each given kind of phenomenon, but their applications must be tightly intertwined because their results cannot be interpreted independently from one another and from the particular contexts in which the explorations take place. This methodological requirement of selective combinations of complementary methodologies for exploring semiotic representations is still not well considered in research on individuals as explored in more detail in Uher (2014c) in this trilogy.

Artificially modified outer appearance: Metatheoretical properties and methodological requirements for exploring individual-specificity

The phenomena of artificially modified outer appearance are conceived in the TPS-Paradigm as those parts of individuals' natural outer morphology that individuals can change and physically modify on an individual level (e.g., hairstyle, tattoos) and to which they can also attach physical objects (e.g., clothing, accessories). These phenomena are located external to individuals' bodies and primarily material physical. They can be changed far more quickly than natural changes can occur in individuals' outer morphology, but they are much less fluctuating than behaviours. As these modifications are often targeted towards others' perceptions and are used to convey particular meanings, the TPS-Paradigm conceives of these phenomena as special kinds of semiotic representations that are characterised by their physical attachment to individuals' bodies. *Individual patterns* in the physical phenomena comprised by artificial outer-appearance modifications can be extroquestively accessed. As they are commonly changed from day to day, they can be scientifically

quantified using records from different days to obtain time-relative probabilities that are then compared post-hoc between individuals and over time to identify *individual-specific patterns*. Individual-specificity in the particular meanings that are attributed to these physical appearances—by the individual him- or herself and by other individuals—is explored in tightly interconnected ways using introquestive and interpretive-hermeneutic approaches (as explored in part II below; cf. Uher 2013, Desiderata 1a, 2).

Contexts: Metatheoretical properties and methodological requirements for exploring individual-specificity

External surroundings or "environments"[9] are often conceptually separated from the individuals under study with the aim to make inferences from specified external conditions and individuals' externalisations to their psychical systems (Shweder & Sullivan 1990; Valsiner 1987), such as when aiming to explore influences of shared or non-shared environments on individuals' "personality" (cf. the nature-nurture controversy). But such dualistic concepts overlook that individuals' externalisations are influenced internally not only by psychical, but also by physical phenomena (e.g., physiology). They also overlook that individuals interact with only those external physical events that are relevant for them given their particular physical and psychical properties (Lewin 1936; Nagel 1974; Rotter 1954). Hence, contextual phenomena cannot be identified and conceived without considering the individuals under study; *exclusive conceptual separations are not possible*. It also follows that dualistic explorations are inherently circular.

The TPS-Paradigm rejects dualistic concepts and conceives of contexts *as composite kinds of phenomena* that comprise several different kinds of phenomena, among them at least one basic kind of phenomenon (i.e., morphological, physiological, behavioural, psychical), which is thus physically inseparable from the studied individual's body and often in the focus of contextual explorations. Moreover, a given contextual phenomenon may comprise further basic kinds of phenomena and/or external phenomena that are independent from the studied individual's body (e.g., family, libraries, vegetation). This composite conception implies that the different kinds of phenomena that are comprised by contextual phenomena *can be conceptually separated from one another*—and thus from the individuals under study—*only inclusively* (Valsiner 1987) and this can be done on the basis of the three metatheoretical properties that the TPS-Paradigm conceives (cf. Uher 2014a, b). Contextual phenomena may comprise both internal and external phenomena, both momentary and non-momentary phenomena, and both "non-physical" and physical phenomena; thus, their metatheoretical properties are heterogeneous. These differences entail that the frames of reference and thus isomorphisms between the different kinds of phenomena comprised can be only low, making the structures of contextual phenomena more complex than the structures of any of the basic kinds of phenomena.

A *situation* is defined in the TPS-Paradigm as the particular *constellation of events of all kinds of internal and external phenomena that are present in a given moment*. Thus, an individual's situation always comprises internal physical (bodily) events and those psychical events that are present in the given moment; thus, all experiencings including all memorised psychical resultants that are being retrieved and reconstructed. From the universe of all external physical events, a situation comprises those events that are present in a given moment and directly perceptible by the individual (consciously or not).

A special kind of situations are *behavioural situations*[10]; they denote the particular constellation of those external physical events that functionally mediate the individual's external changes or activities in a given moment (i.e., his or her behaviours). The events constituting behavioural situations, in and of themselves, are external to the individual, but the criterion for demarcating these particular events from the universe of all external physical

[9] *Culture* is also often conceived of as "environment" or context, but as it denotes semiotically mediated systems of socially shared meaning (Geertz 1973; Weber 1904), the TPS-Paradigm conceives of cultures as semiotic representations that are explored accordingly.

[10] Previously called the "environmental situation" (Uher 2011a, 2011b, 2013; Uher et al. 2013a).

events present in a given moment is bound to the properties of that individual: their effectiveness to make functional the individual's externalisations that thereby become behaviours. Importantly, this demarcation is based on individuals' *external* bodily events (i.e., on behaviours), rather than on internal ones (i.e., psychical events). This enables their exploration using extroquestive and quantitative approaches (cf. Uher 2013, Desideratum 2c).

All behavioural situations, as they functionally mediate the individual's behaviour, are always also psychically relevant for the individual. But some situations are merely *psychically relevant* in that the individual interacts only internally with external physical events (e.g., perceiving and reading a text) without interacting with them behaviourally as well. Differentiating behavioural situations from other kinds of situations allows researchers to scrutinise the ways in which individuals connect with external events, considering that direct inferences from behavioural to psychical events cannot be made (cf. Uher 2013, Desideratum 7).

The particular external events of which an individual's situation is constituted 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 or *while* he or she reconstructs pertinent psychical representations; before and thereafter, they conceptually belong to the universe of external physical events. Exploring individual patterns and individual-specificity in the constellations of particular internal and external physical events and in the relevance and meaning that they have for individuals' behavioural and psychical phenomena requires targeted and tightly interconnected applications of extroquestive and quantitative approaches and of introquestive and hermeneutic-interpretive approaches as explored in the following using the example of the development of "personality" taxonomies (as explored now in part II).

II) Developing "personality" taxonomies: Scrutinising metatheories and methodologies

The philosophy-of-science foundations outlined above (part I) are now applied to scrutinise the metatheories and methodologies that researchers use to develop comprehensive "personality" taxonomies focussing on the primary identification of individual-specificity (different kinds of taxonomies are discussed in Uher 2014c in this trilogy). The following (part II) explores how the researchers' metatheoretical assumptions about what they conceive of as "personality" (implicitly) guide their decisions about *1)* the *selection of phenomena and their defined events* to be studied for individual-specific patterns, *2)* the *methods of generating empirical data* of the selected phenomena and events and *3)* the *rationales used to extract the "most important" variants of individual-specificity* and to construct taxonomic models. A special focus is on identifying potential mismatches between the researchers' (explicit and implicit) metatheories about the phenomena under study and the methodologies that they use for their exploration (cf. phenomenon-methodology matching).

1) Classes of selection approaches

For developing "personality" taxonomies, researchers must first decide about which particular kinds of phenomena and which of their manifold events they want to study—i.e., they must specify the sets of elements to be explored. These decisions are (explicitly or implicitly) based on the researchers' metatheoretical concepts of "personality". The TPS-Paradigm refers to the strategies that researchers pursue to make decisions about the kinds of phenomena and events to be explored for individual-specificity as *selection approaches*. Establishing *comprehensive* taxonomies requires methodological approaches that enable researchers to select sets of elements that are *representative* for the diversity of events that can be demarcated in the phenomena under study and to select among them the sets of elements to be studied. Norman (1967), for example, called for taking as the "fundamental data base the set of all perceptible variation in performance and appearance between

persons or within individuals over time and varying situations that are of sufficient social significance, of sufficiently widespread occurrence and of sufficient distinctiveness" (p. 2). To achieve this, taxonomic "personality" researchers developed various methodological approaches to guide their decisions about the "initial source from which to sample categories" (John et al., 1988, p. 174).

Building on a classification system established for selection approaches used in the much smaller and younger field of nonhuman primate "personality" research (Uher 2008a, 2011a, 2011b), the TPS-Paradigm provides a system for classifying selection approaches that are applied in human "personality" research with a focus on methodological approaches that are targeted at comprehensive taxonomies (ignoring those targeted at selected domains of individual differences; cf. Uher 2013, Desideratum 1c). On the basis of the metatheoretical rationales that researchers use for demarcating, selecting and lexically encoding the phenomena and events under study—often focused on "personality" constructs, variables and categories of events—five major classes of approaches (a-e) are distinguished.

a) Nomination approaches

Nomination approaches rely on individuals (e.g., researchers, informants) who nominate phenomena, events and constructs that these nominators deem important for exploring individuals in a given population. In psychology, many "personality" constructs, theories and models were initially proposed (i.e., nominated) by researchers who pioneered a particular field. A comprehensive nomination approach relying on informants was realised, for example, in cross-cultural psychology by Church and Katigbak (1988, 1989) who asked several hundred insider-informants from the Filipino culture to list situations and associated behaviours that they considered to be indicative of "healthy personality functioning".

But how do individuals come up with ideas for particular constructs of individual-specificity? What prompted Galen to develop the four temperament constructs that are used in everyday psychology still today? What prompted Freud (1923) to propose the "Id", "Ego" and "Super-ego" as the three central instances of his "personality" theory? When theories, constructs and hypotheses have not yet been developed in a given field, new ideas can be generated using *abduction,* a special form of logical inference (Lahlou 2011; Peirce 1901, CP 7.218). That is, when confronted with facts in need of explanation (e.g., observations of individuals in everyday life, the lab or clinic), individuals generate hypotheses and concepts the consequences of which, if they were true, would resemble the facts found. Thus, if such hypotheses can be generated, there is reason to assume that they provide valid "explanations". But their truth remains *uncertain* because abduction seeks explanations in retrospect—from facts found in the present, possible causes are inferred that necessarily lie in the past (Peirce 1903, CP 5.188-5.189; Valsiner 2012). The abductive generation of "personality" constructs therefore entails intricacies for all steps of model development.

Given the peculiarities of abductive reasoning, what kinds of phenomena can be selected with nomination approaches? As individual-specificity cannot be directly perceived, these approaches require nominators to retrieve pertinent psychical representations that they have developed over time from processing broad ranges of perceived physical events (e.g., behaviours, physiognomy), perceived own psychical events and possible psychical events inferred in others, from constructing individual-specific patterns therein and from abducting possible explanations (Uher 2013). Hence, contrary to widespread assumptions, nomination approaches do not allow researchers to select the nominated phenomena and events, *in and of themselves*, so that these can be scientifically explored for individual-specific patterns. Instead, they allow researchers only to select the nominators' (individual and/or socially shared) *psychical representations of individual-specificity* (cf. the lexical approaches below).

Importantly, psychical and semiotic representations—and thus also nominations—are inherently prone to anthropo-, ethno- and ego-centric biases (cf. Uher 2014a in this trilogy), such as people's conceptions of "personality" or "healthy personality functioning". Psychical representations are also prone to various fallacies of the human mind. For example, as individuals are substantially similar to one another given their conspecifically shared

organismal properties (Uher 2011a, 2011b), people abstract from commonalities and focus on the *minor variations that are informative for differentiating highly similar individuals*. Therefore, people pay attention to fine-grained differences, for example, in the faces and behaviours of individuals in their population, but much less to what is common to all of them or what differentiates individuals from other human populations or from other species. Those parts of people's pertinent psychical representations that they use most frequently and in socially shared ways for differentiating individuals in their everyday lives become psychically represented in more pronounced ways. The corresponding individual differences are then considered to be *salient,* and they appear in people's minds to be much larger than can actually be observed (Lahlou 1998).

Another fallacy, called the *law of least effort* (Royce 1891), derives from the human mind's limited abilities to deal with complexity leading to the human tendency to seek regularity and simplicity. Likely because of this, people psychically represent individual-specific behaviours in much simpler and more consistent structures than can actually be found in ethological measurements (as empirically demonstrated in Uher et al. 2013a). These findings reflect the very function of psychical constructions and representations of individual-specificity and their lexical encodings: they facilitate the ability to differentiate between highly similar individuals (Lahlou 1998; Uher 2014a in this trilogy).

Further biases arise because people psychically construct individual-specificity also in experiencings although others' psychical phenomena cannot be directly perceived or straightforwardly inferred from their externalisations. When people psychically construct and represent individual-specificity, others (e.g., researchers) cannot know what particular inferences those people have actually made and, in general, which particular phenomena and events they have actually considered. Hence, the universe of events (e.g., memorised perceptions of events, constructs of individual-specificity) are unknown as are the rationales by which particular individuals demarcate and choose the particular sets of events that they nominate in a given study—and hence the comprehensiveness of selections enabled by nomination approaches.

Consequently, convergences between nominations of different people and between "personality" models derived with nomination approaches (cf. Matthew, Deary & Whiteman 2003) likely result from the nominators' shared human properties of their psychical systems based on which they perceive, abstract from and psychically represent events and construct individual-specificity in somewhat similar ways, thus reflecting inherently anthropo-centric viewpoints. Many of these psychically representations are inseparably interwoven with socio-culturally shared meanings and their externalisation in signs (especially lexical encodings) that further promote (and are aimed at) the development of similar psychical representations in different individuals, thus also reflecting ethno-centric viewpoints (Uher 2014a in this trilogy and Uher 2014d).

In sum, individuals' psychical representations, and thus their nominations, need not—and given their different nature are unlikely to—appropriately reflect *individual-specificity* in the phenomena of morphology, physiology, behaviours, the psyche, semiotic representations, artificially modified outer appearances and contexts. Comprehensive taxonomisations of these kinds of phenomena require different classes of selection approaches.

b) Physical system approaches

In physical system approaches[11], researchers select events from complex physical systems that have naturally evolved in a given population, such as physiological or behavioural systems or the systems of the physical phenomena (e.g., words in the lexica) that are comprised by composite kinds of phenomena (e.g., semiotic representations). This point is pivotal. As selections are based on *physical* systems, the universe of their phenomena is or can be made directly perceptible by multiple individuals (at least

[11] Previously labelled "manifest system approaches" (Uher 2013) and "bottom-up approaches (Uher 2008a).

theoretically) and thus accessible by extroquestive methods. This facilitates the intersubjective demarcation of events in the phenomena under study and the explication of the rationales that are used for selecting the sets of events to be studied to achieve representative selections. (Such approaches are sometimes also called “emic” in “personality” psychology, but connotations vary. For example, in cross-cultural psychology, “emic” denotes explorations of populations “as from inside”, Church 2001; which, however, may also be actualised with nomination approaches, see above).

Lexical physical system approaches

Lexical physical system approaches belong to this class because the events to be studied are demarcated and selected on the basis of the physical phenomena (i.e., written words in the lexica) that communities of individuals have developed and use as signs to physically represent socially shared psychical representations about individual-specificity. The universe of these events in terms of single words, as created so far and currently in use, is comprehensively known and catalogued in the lexica of many languages. The morphology and phonology of words are directly perceptible by multiple individuals, thus extroquestively accessible. This enables lexical “personality” taxonomists to systematically base their selections of the sets of elements to be studied on well-defined and exhaustive universes of explicitly known events.

Applications of lexical physical system approaches are based on the so-called “lexical hypothesis”, which proposes that those individual differences that communities consider to be salient and socially relevant in their everyday lives become encoded in their natural languages over time (Galton 1884; John et al. 1988). This hypothesis reflects the very function that signs have for enabling social exchange and the co-construction of meanings (for details, see Uher 2014d). As semiotic representations are composite kinds of phenomena, lexical approaches can explore four different issues—individual-specificity in the use of lexical signs (e.g., in speech) and in the fields of meaning ascribed to particular lexical signs (e.g., questionnaire items) and to particular events and phenomena (e.g., individual behaviours) as well as lexically encoded psychical representations about individual-specificity (e.g., individual-specific behaviours or experiencings) both individual-specific and socially shared (e.g., personal and social beliefs; Laucken 1974).

So far, personality psychologists have largely applied *decontextualised lexical approaches* in which researchers select person-descriptive words (e.g., trait-adjectives) as listed *alphabetically* in dictionaries. For example, Allport and Odbert (1936) extracted 17,953 person-descriptive words from about 400,000 entries in the 1925 edition of Webster’s English Dictionary. The words selected (after some first reductions, see below) are commonly presented *separately* and in a *randomised* order to the individuals under study to generate data using standardised questionnaire methods (see below). Prominent models thus-derived from English language dictionaries are, for example, the 16 Personality Factor Model (Cattell 1946), the Big Five Model (Goldberg 1990), the Hexaco-Model (Ashton & Lee 2005) and the Big Seven Model (Almagor, Tellegen & Waller 1995).

What issues have been explored using decontextualised lexical approaches so far? Surprisingly, researchers have seldom explored individual-specificity either in how people use lexical encodings in their everyday lives (as explored below) or in the fields of meaning that respondents construct for the standardised lexical items selected by researchers (studies demonstrating within- and between-individual variations in such fields of meaning are found, e.g., in Arro 2013; Rosenbaum & Valsiner 2011). Both kinds of investigation are required to explore the meanings that the individuals under study aim to lexically represent and encode. As meanings are not immanent to signs but inherently vary within and across individuals, times, populations, situations, etc., the construction of meanings for the items studied and for the results obtained largely relies on the researchers—who may thereby introduce all kinds of ethno- and ego-centric biases (Lahlou 2011). Such approaches have thus only a small potential to reconstruct the systems of socially shared or individual beliefs and the implicit theories about individual-specificity that *the individuals under study effectively use in their everyday lives* (cf. Uher 2013, Desiderata 4, 7c).

Despite these limitations, decontextualised lexical approaches are frequently applied in „personality“ psychology. This is likely due to the widespread, but erroneous assumption that lexical signs would directly reflect the denoted phenomena and events, *in and of themselves*, rather than individuals' pertinent psychical representations. Bentham (1748-1832) already pointed out that words are ordinarily and uncritically assumed to correspond to “real entities”, which may be possible only for physical events that are directly perceptible without reflection but not for “fictitious” ones (Ogden 1932, p. 7). The inherently abstract and inferential ideas of individual-specificity are “fictitious” because they refer to temporal, differential and largely probabilistic patterns that cannot be directly perceived (Uher 2013, 2014a). This fallacy of mistaking purely linguistic abstractions for concrete entities (the fallacy of misplaced concreteness; Whitehead 1929) is rarely considered in „personality“ psychology—although it is centrally important and was explicitly addressed early on (Allport & Odbert 1936, p. 1).

Specifically, “exploring concepts that are constituted by words [e.g., lexically encoded psychical representations] with tools that are constituted by words (language) makes it difficult to differentiate the tools from the measures of the observed phenomenon” (Lahlou 1998, p. 52[12]). Lexical „personality“ research is further complicated by the fact that person-descriptive words (e.g., trait-adjectives) often denote not only *single events* perceptible in an individual (e.g., an *aggressive* behavioural act) but may also imply socially shared *ideas of individual-specificity in such events* (e.g., an *aggressive* “personality”)—although individual-specificity cannot be ascertained from just a single event and just a single individual (for details, see Uher 2013, cf. Desideratum 2b and 2014a, c in this trilogy).

The widespread use of decontextualised lexical approaches may also be based on the idea that common-sense knowledge and social representations (Moscovici 1961) are “common” and “social” not just because people share some basic representational structures and cognitive elements, but also because people (including researchers) *implicitly assume that they are being shared* by all members of their community (Lahlou 1998). Assumptions of such “overarching frame-theories”[13] in common-sense knowledge are based on the fact that people can understand each others' descriptions and explanations of individual behaviours without having first explained to one another their pertinent *individual* beliefs and implicit theories, although these are obviously very diverse (Laucken 1974, p. 24).

Psychical and semiotic representations are inherently contextualised (Jovchelovich 2007; Lahlou 1998). Reconstructing the belief systems about individual-specificity that people semiotically encode in their everyday language therefore requires *contextualised lexical approaches*. Some examples may illustrate basic principles.

To comprehensively reconstruct the socio-culturally shared meanings of eating-related behaviours that are lexically encoded in the everyday language in French (though not focussing on individual-specificity), Lahlou (1996a, 1998, 2001) systematically extracted 544 lexicographically documented synonyms and analogues of “to eat” from a large dictionary (Grand Robert, French equivalent of the English Webster). But instead of using only these 544 single words and presenting them separately to respondents on standardised questionnaires to generate assessment data, Lahlou collected the *textual materials* of the extensive definitions that the dictionary provided for these words into a single corpus in which he statistically analysed (after eliminating rare words and function words, see below) the co-occurrences of *all* words contained therein (i.e., 137,567 occurrences with a vocabulary of 16,896). Such a *dictionary-based contextualised lexical approach* has not yet been used to reconstruct socially shared representations of individual-specificity as lexically encoded by different national and language communities.

Another contextualised lexical approach by Laucken (1974) was based on everyday conversations and public media reports. Over 18 months, he collected lexically encoded descriptions and explanations of individual behaviours that people used in complex real-life

[12] Translated original: “Approcher des concepts constitués de mots avec un outil (la langue) constitué de mots fait qu'on distingue mal l'outil de mesure du phénomène observé.” (Lahlou 1998, p. 52).
[13] Translated original: “Übergreifende Rahmentheorie” (Laucken 1974, p. 24).

situations. Using systematic linguistic and content-based analyses, Laucken reconstructed and explicated from these materials the structure of pertinent common-sense knowledge, i.e., the "explanatory repertoire and instruments"[14] (p. 23) of his German study population. The complexity that Laucken revealed in people's implicit everyday assumptions about psychical dispositions and processes governing individual behaviour suggested that, in real everyday situations, people use these belief systems primarily on preverbal levels. Thus, these beliefs are not explicitly encoded in single words, but are rather only implicitly encoded in complexes of multiple interrelated and thus contextualised words (e.g., conversations, letters, idioms; cf. Allport 1942, 1965; Uher 2013, Desiderata 1d, 9).

Both Lahlou (1996a, 1998, 2001) and Laucken (1974) corroborated their findings with analyses of textual materials that they obtained from interviews with free-response formats. "Personality" psychologists could use similar methods to explore individual-specificity not only in the fields of meaning that people construct for particular lexical encodings but also in people's use of lexical encodings and in the psychical representations of individual-specificity that they lexically encode. Such methods are more labour-intensive than collections from existing documental sources (e.g., dictionaries) but can capitalise strongly on software tools for digital text analysis, such as from computational linguistics (Bolden & Moscarola 2000) or textual data analysis (Neuman 2014; Reinert 1983, 1990). A study using online documents to explore people's use of person-descriptors is described below (see Methods of data generation).

Although the natural language terms that encode everyday constructs of individual-specificity (e.g., person-descriptors) are particularly differentiated and complex as compared to those that encode other psychical phenomena (e.g., memory), lexical "personality" psychologists should consider that "language—the main tool for description and cognitive and 'scientific' reasoning—represents only a small part or rather only a very special projection of the individual's mental life" (Lahlou 1998, p. 135[15]). Some parts of individuals' psychical representations are not well reflected in everyday language because psychical phenomena are far more diverse than lexically encoded conscious thinking (Lahlou 1998; Larocco 2014).

The Behavioural Repertoire x Behavioural Situations Approach (BR_XBS-Approach[16])

The BR_XBS-Approach is a behavioural physical system approach that was developed within the TPS-Paradigm to comprehensively taxonomise individual-specific behaviours in human and nonhuman populations on the one hand and people's pertinent psychical representations on the other hand (cf. Uher 2013, Desiderata 2, 5). Which of these kinds of phenomena are studied depends on the method of data generation used (see below).

As in any kind of research, the BR_XBS-Approach necessarily relies on language. But in contrast to nomination and lexical approaches, the selection of events of behaviours and behavioural situations to be studied for individual-specificity is guided neither by people's *psychical representations of individual-specificity* nor by the *everyday language* in which such psychical representations are encoded. Rather, it is based on *scientific definitions*, demarcations and categorisations of *single events of behaviours and of behavioural situations* that *scientists* who are exploring not individual-specific but *average* behavioural patterns of individuals of a particular age, sex, etc. in a study population or species have established and encoded in *scientific language* (Uher 2008a, b, 2011a, b, 2013, Desideratum 1f). Therefore, the comprehensiveness of the selections and thus of the taxonomisations of individual-specific behaviours and people's pertinent psychical

[14] Translated original: "Erklärungsrepertoire, Erklärungsinstrumentarium" (Laucken 1974, p. 23).
[15] Translated original: "La langue, principal outil de description et de raisonnement cognitif, 'scientifique', ne représente qu'une petite partie, ou plutôt une projection très partielle, de la vie mentale du sujet." (Lahlou 1998, p. 135).
[16] Previously called the Behavioural Repertoire Approach (Uher 2008a, 2008b; Uher & Asendorpf 2008; Uher et al. 2008) or the Behavioural Repertoire x Environmental Situations Approach (BRxES-Approach; Uher 2011a, 2011b, 2013; Uher et al. 2013a, 2013b).

representations that is enabled by this approach depends on the comprehensiveness of the pertinent behaviour scientific knowledge base.

The rationale of the BR_XBS-Approach specifies a multi-step procedure for researchers to systematically select behavioural and situational events from their known universes (as previously categorised by behavioural scientists) and to generate therefrom—rather than from people's (including researchers') implicit ideas about "personality"—working constructs of contextualised individual-specific *behaviours* (for details, see e.g., Uher et al. 2013a). Anthropo- and ethno-centric biases can thus occur in the demarcation, description and categorisation of *events* of behaviours and behavioural situations established by the behavioural scientists, but not in the "personality" researchers' generation of constructs of *individual-specificity* in these events. Importantly, the generated constructs are *purely behaviour-descriptive* and do not imply any (possibly causally associated) psychical events that could be inferred from the behaviours described. This considers the different metatheoretical properties of behavioural phenomena versus psychical phenomena that are therefore differentiated from one another in the TPS-Paradigm (Uher 2014a).

The BR_XBS-Approach enables researchers to meet frequent calls from ecological psychologists to accomplish the "propaedeutical task of gathering extensive naturalistic data on what goes on in different types of settings" (Little 1987, p. 213) and to develop "individual difference measures tapping a diverse set of environmental themes" (p. 211). Previous approaches aimed at tackling this task were based on "environmental folk-concepts" to identify "functionally important …[constructs] through which people code their own and others' conduct" (Little 1987; such as the Act Frequency Approach, Buss & Craik 1983)—thus, on nomination approaches. By contrast, the BR_XBS-Approach allows comprehensive taxonomisations of individual-specific behaviours to be made *independent of* people's pertinent psychical representations (cf. Uher 2013, Desideratum 2). In addition, it allows researchers to systematically explore the latter based on the generated behavioural working constructs, i.e., based on descriptions of external physical events that people are *assumed* to psychically represent and in which they are *assumed* to construct individual-specificity—rather than based on externalisations of the pertinent psychical representations under study (as in the nomination and lexical approaches; cf. Uher 2013, Desiderata 4, 5).

Importantly, this broad-based approach enables the identification of patterns that are individual-specific and of patterns that are population- and species-typical—in both behaviours and people's pertinent psychical representations. This differentiation and the identification of both kinds of patterns is essential for explorations of individual functioning and development, which, contrary to common research practice, cannot be explored on the basis of individual-specific patterns alone (as elaborated in Uher 2014c in this trilogy).

To explore individual-specific behaviours, the generated working constructs are operationalised by contextualised behavioural variables and studied with extroquestive ethological methods. To explore the mental representations that particular individuals or communities (e.g., adults from a particular community) have developed of the individual-specific behaviours of particular individuals (e.g., children from this community), the working constructs are operationalised using, for example, video-based methods or lexical encodings and are studied with introquestive methods. This tight conceptual matching enables systematic contrasts between individual-specific behaviours and people's pertinent psychical constructions and representations to explore individual-specific and socially shared patterns in the perception, interpretation (e.g., inferences to psychical events), lexical encoding and appraisal of individual behaviours (e.g., valences; cf. Uher 2013, Desiderata 5, 6).

As the BR_xBS-Approach was developed in cross-species comparative research, it has already been applied to comprehensively categorise individual-specific behaviours in capuchin monkeys (Uher et al. 2013a) and great apes (Uher, Asendorpf & Call 2008) and to investigate the representations that human observers have developed of individual great apes (Uher 2011b; Uher & Asendorpf 2008) and crab-eating macaques (Uher et al. 2013b). This approach allowed for the identification of kinds of individual-specific behaviours that were already previously described in these species but also of additional ones that were not previously shown by other (mostly nomination or etic) approaches.

Taxonomic investigations of individual-specific behaviours in human populations and relations to people's pertinent—individual and socially shared—psychical representations and their lexical encodings still need to be done. Straightforward applications can be made to explore individual-specific behaviours in children (and adults' pertinent psychical and semiotic representations) because comprehensive literature on child behaviour is available from child ethology (e.g., Dunn 2005; Smith & Connolly 1980). Given the complexity of behavioural situations and the constraints on observations in all domains of everyday life, researchers may focus in a given study on particular settings (e.g., behavioural situations in preschools) and explore children's everyday lives using multiple complementary research programmes.

Applications of the BR_xBS-Approach to adult humans will be more challenging given the complexity of adult behaviours and especially of the behavioural situations that are encountered by adults, which, moreover, change quickly in modern societies (e.g., technical and institutional installations; Lahlou 2008). There still seems to be a lack of comprehensive descriptions and categorisations of adult human behaviour, especially for the people in Western societies who are most frequently studied in psychology. Adult human behaviour is primarily studied only in relation to or as an externalisation of psychical phenomena and is rarely described and categorised in its own rights (but cf. Archer 1992; Eibl-Eibesfeld 1986), perhaps in lack of differentiation of behavioural from psychical phenomena (Uher 2014a, 2013). The increasing digitisation and computerisation of everyday life and new portable audiovisual recording techniques (e.g., reality mining, Dong, Lepri & Pentland 2011; first-person perspective recording, Lahlou 2011) open up new avenues for real-life records of individuals' behaviours that will enable comprehensive studies of adult human behaviours and the behavioural situations that they frequently encounter in their everyday lives.

Endophenotype approaches and other approaches

In endophenotype approaches, researchers explore individual-specificity in the individuals' internal physical systems many of which are assumed to be related to psychical and/or behavioural phenomena, such as *psycho-physiological systems* (e.g., Fahrenberg & Myrthek 2001; Fahrenberg, Myrtek, Pawlik & Perrez 2007), *brain morphology* (e.g., Thompson, Cannon & Toga 2002) and *molecular-genetic structures* (e.g., Gunthert, Conner, Armeli, et al. 2007). As these systems are physical, the universe of selectable events can be made directly perceptible for multiple individuals (i.e., extroquestively accessible) and thus can be (at least theoretically) explicitly known. But this is complicated by these events' internality and molecular size, which require invasive and technically assisted methods. The rationales for demarcating and selecting the elements to be studied—and thus their potentials for comprehensive selections—are therefore based on the established scientific knowledge about these systems and on the technical possibilities available. Physical system approaches that allow researchers to demarcate and comprehensively select events in individuals' *outer morphology* for taxonomising individual-specific patterns have yet to be developed. This can be done by capitalising on the expertise and previous developments made in the neighbouring disciplines of psychology and other sciences (Uher 2013, Desideratum 1c).

The same applies to physical system approaches for comprehensively exploring the external physical phenomena comprised by the phenomena of *artificially modified outer appearances* and the phenomena of *contexts*. When developing such approaches, researchers should carefully consider that, to study individual-specificity in these composite kinds of phenomena, the physical phenomena must be explored *together with* the psychical phenomena with which they are inseparably intertwined, which ultimately requires selective combinations of extroquestive and quantitative approaches and of introquestive and hermeneutic-interpretive approaches that are each targeted at the different kinds of phenomena (Uher 2014a; Valsiner 1987, 1998). This is well considered in many ecological and environmental psychology concepts and approaches (e.g., the Behaviour Settings Approach; Barker 1968) that aim to first describe external physical events in natural science terms—as much as this is possible given that researchers themselves are individuals

holding particular views on these events—and to then explore the meanings that are ascribed to these physical events by particular individuals or communities and the functions that particular kinds of settings fulfil for these people (Little 1987). The external physical phenomena of the contextual phenomena that people encounter in their everyday lives are highly complex because contexts can comprise diverse kinds of phenomena with thus heterogeneous metatheoretical properties. Therefore, taxonomic categorisations and descriptions of contextual phenomena require higher levels of abstraction than is required for the basic kinds of phenomena (e.g., behaviours) for which more homogeneous metatheoretical properties can be conceived.

Physical system approaches provide the essential means for systematically exploring individual-specificity in psychical phenomena—both experiencings and memorised psychical resultants—for which, given their "non-physicality" and thus potentially unlimited universes of possible sets of events, no comprehensive selection approach can be devised.

c) Cumulative-gain-in-knowledge approaches

In cumulative-gain-in-knowledge approaches, researchers refine and compile constructs and investigatory variables that were *already developed for their study population based on other classes of selection approaches*—including those not targeted at comprehensive modelling. A prominent example is the Five Factor Model and its pertinent theory (McCrae & Costa 1997). The very names of the corresponding inventories—such as the NEO Five-Factor Inventory (NEO-FFI) and the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae 1992)—indicate that this model was derived by compiling various constructs. To the two dimensions Neuroticism (N) and Extraversion (E) already studied by Eysenck (1947), "Costa and McCrae (1980) added a dimension they called Openness to Experience (O), and later (1989) created scales for Agreeableness (A) and Conscientiousness (C)" (McCrae & John 1992, p. 180)—constructs already described by other researchers (John et al. 1988; McCrae 2011; Saucier & Goldberg 2001). The development of the Five Factor Model with a cumulative-gain-in-knowledge approach is also reflected by the authors' own statement that, in the future, "researchers may discover another factor or other factors of personality of comparable scope to N, E, O, A, and C. At that point it will be time to modify [the Five Factor Model]" (McCrae & Costa 1999, p. 147). Similarly, in the International Personality Item Pool (IPIP.org), findings on constructs and variables of many established inventories are pooled together (Goldberg, Johnson, Eber et al. 2006).

The rationale behind cumulative-gain-in-knowledge approaches is that comprehensive selections of phenomena and events to be studied for individual-specificity can be made by capitalising on the empirical findings that were already described for the particular population under study. "Five-factor theory is the outgrowth of a remarkably consistent set of empirical findings" (Cervone, Shadel, & Jencius 2001, p. 35). However, selections can only be as comprehensive as the approaches that were originally used to develop the constructs. Converging findings (McCrae 2011) are no evidence of comprehensiveness. Importantly, the particular *kinds of phenomena* and events that cumulative-gain-in-knowledge approaches enable researchers to select and the comprehensiveness of their selection depend on the *original* constructs that are being compiled, specifically, on the selection approaches and especially on the methods of data generation and the reduction principles used for their *original* development (see below).

d) Etic (or top-down) approaches

Some personality psychologists explore their study populations using taxonomic models, constructs or investigatory variables that were *originally developed for other populations* (i.e., imposing them in a "top-down" fashion on their study population). The term "etic" thereby denotes explorations "as from outside of a particular system" (Cheung, van de Vijver & Leong 2011; Church 2001). An example is the use of translated versions of standardised Five Factor Model inventories to study individuals in national and cultural communities other than those of the Anglo-American communities for which this model and its inventories were originally developed (e.g., Terracciano et al., 2005).

In translations, lexical signs (i.e., words) are exchanged with the lexical signs that are used in other languages to encode equivalent meanings. But meanings inherently vary across language communities (even within one language), such that one-to-one translations are not always possible. When the *respondents'* interpretations of the items translated from another language are not known, meaning construction rests solely with the few researchers and expert translators who interpret these items against their own socio-cultural and personal (academic) backgrounds and who may thereby introduce all kinds of ethno- and ego-centric biases on their part. But in other populations, individuals may consider other kinds of individual-specificity to be salient and may interpret, appraise and therefore construct and lexically encode them differently. Purely linguistic translations cannot unravel such cross-population differences.

In etic (top-down) approaches, risks for anthropo- and ethno-centric biases are particularly frequently overlooked when the imported models have already reached the status of an established model for taxonomising individual-specificity in the original study population. For example, Five Factor Model inventories are increasingly used to develop taxonomic models of individual differences not only in other human populations, but also in other species, such as chimpanzees (King & Figueredo 1997) or rhesus monkeys (Weiss, Adams, Widdig & Gerald 2011). Vice versa, however, comprehensive models taxonomising, for example, individual-specificity in rhesus monkeys' behaviours, morphology or physiology are unlikely to be considered comprehensive selections for taxonomising individual-specificity in these particular kinds of phenomena in humans. Etic approaches cannot enable researchers to systematically select phenomena and elements for their particular study population because these approaches are inherently confined to the constructs and variables developed for other populations (Church 2001; Uher 2008a, 2008b)—even if these latter were developed using approaches enabling comprehensive selections. Importantly, the particular kinds of phenomena that etic approaches allow researchers to select depend on the selection approaches and, in particular, on the methods of data generation with which the *original* constructs and investigatory variables were developed (see below).

e) Mixed approaches

Sometimes researchers combine elements of different classes of approaches in their selection procedures (Cheung et al. 2011). For example, from the four major categories of person-descriptive terms that Allport and Odbert (1936) derived with a lexical physical system approach, Cattell (1943) used the terms from the first category and added about 100 temporary-state terms that he nominated himself, thus using a nomination approach. After various reduction steps (see below), he also added some further terms and constructs that he derived from the psychological literature on typologies and factor-analytic studies (for details, see John et al., 1988), thus using a cumulative-gain-in-knowledge approach. Researchers using mixed approaches seldom explicate the rationales that they use to select and combine approaches, constructs and variables. This lack of transparency is a reason to assume that their rationales may be based on abductive reasoning. That is, researchers may generate a selection that they (implicitly) consider to be representative of the individual-specific variants in their study population given their particular (implicit) metatheories, thus opening doors to all kinds of biases on their part.

Content-based versus strategy-based selection principles

Two metatheoretical principles can be identified that underlie these different classes of selection approaches and their rationales. These principles determine the abilities of these approaches to minimise influences of the researchers' own ideas and constructs of "personality" on the selections made (Uher 2008b; Uher 2013, Desideratum 1c).

Content-based selection principles require researchers to *specify individual-specific variants in particular kinds* of events and phenomena. Such principles underlie nomination approaches, cumulative-gain-in-knowledge approaches, etic (top-down) approaches and mixed approaches. Selecting events and phenomena in which individual-specific variants are salient to particular individuals or communities in everyday life or that have already been described for the same and/or other populations requires researchers to focus directly on

their particular qualities, i.e., on the contents described by "personality" constructs or encoded by investigatory variables. This means, in effect, that the particular kinds of individual-specificity to be explored have to be specified before researchers can even begin to explore and taxonomise such variations in their study population (cf. John et al. 1988). As individual-specificity cannot be directly perceived at any given moment, this entails that, when deciding what to study, "personality" researchers inevitably have to rely more strongly on their own psychical constructions and representations of individual-specificity and those that are socially shared in their particular communities, which influence their metatheories (Uher 2011a). John and colleagues (1988, p. 183), for example, ascertained that Cattell's "various lists [of person-descriptive terms] appear to represent primarily … [those constructs] that he himself considered the most important". These risks for ego-, ethno-, and anthropocentric biases also confine researchers' opportunities to develop taxonomic models that are representative of the individual-specific patterns exhibited in particular kinds of phenomena by particular study populations.

Strategy-based selection principles, by contrast, provide researchers with *strategies for systematically selecting events* or for generating constructs or investigatory variables to comprehensively taxonomise individual-specificity in defined kinds of phenomena *without already specifying any particular events, constructs or variables*. These principles offer explicitly formulated theoretical frameworks on which researchers can base their selections without compelling them to directly focus on the particular qualities of individual-specificity to be studied. This eliminates the necessity for researchers to rely unintentionally on their own personal and socially shared ideas of "personality", thus substantially reducing their risks for introducing pertinent biases. Strategy-based selection principles therefore have the power to enable representative selections for establishing comprehensive taxonomic models (cf. Uher 2013, Desiderata 2, 5, 7). Physical system approaches are built on such principles. The rationale of lexical physical system approaches, for example, demarcates all person-descriptive words in the lexica as the universe of elements but does not suggest that any particular ones are to be selected. Their rationale does not rely on (implicit) assumptions about individual-specific patterns, their particular qualities and structures in a given population but on the assumption that individuals generally co-construct psychical representations about individual-specificity in their community and encode these ideas in their everyday language (Lahlou 1996b, Moscovici 1961; Uher et al. 2013b, cf. also John et al. 1988; Saucier & Goldberg 2001).

The examples above should be sufficient to highlight the finding that prominent taxonomies of human "personality" have thus far been developed primarily by using content-based selection principles (e.g., the Five Factor Model), which are largely based on people's (including researchers') psychical representations of individual-specificity. The only established models that were developed using strategy-based selection principles are those derived from lexical physical system approaches (e.g., the Big Five Model). But these approaches are explicitly targeted at exploring people's lexically encoded psychical representations of individual-specificity. This explains the strong similarity between these two prominent models with regard to the particular "personality" constructs that they comprise (but not their interpretation as explored in Uher 2014c in this trilogy). Their similarity also derives from the facts that the Five Factor Model capitalises on advances made by other approaches, including lexical ones, and, in particular, that both models were developed empirically with the same kind of data.

2) Methods of data generation

Once the particular phenomena and events to be explored for individual-specificity are selected, researchers must define physical entities in terms of data variables into which relevant information from the demarcated phenomena and events as perceived and conceived by human individuals can be appropriately converted and semiotically represented. Importantly, to establish intersubjectivity and comparability, researchers must *explicate* the encoding schemes by which these conversions are made and how perceived events are encoded into these variables as data for each given study (see also Uher 2014a,

c in this trilogy). The TPS-Paradigm refers to the particular operations and practices that are used to actualise conversion and encoding decisions made in empirical studies as *methods of data generation*. In this second step of taxonomy development as well, all kinds of anthropo-, ethno- and ego-centric biases on the part of the researchers can occur because researchers may be prone to generating data that confirm their preconceived ideas, thus unintentionally fitting the *data* to their implicit theories and models (Lahlou 2011).

The TPS-Paradigm emphasises that the particular method of data generation to be used depends solely on the metatheoretical properties of the particular kinds of phenomena under study (cf. phenomenon-methodology matching; see also Uher 2014a, c in this trilogy). The chosen selection approach and method of data generation are therefore often related. For example, to taxonomise a community's lexically encoded representations of individual-specificity, researchers may use lexical physical system approaches to comprehensively select the sets of events to be studied, and they may convert and encode individuals' lexical externalisations and their occurrences into defined variables as data.

But the selection approach in and of itself does not determine any specific method for generating data; it is just a means to enable representative selections of the sets of events to be studied. The *selection approach and the method of data generation are two independent epistemological steps* about which researchers have to decide, depending on which kinds of phenomena they want to explore and how comprehensively (Uher 2008b). For example, the BR_xBS-Approach allows researchers to generate sets of constructs of contextualised individual-specific behaviours that are representative of the known behavioural repertoire of a given population. But only the method of data generation determines which particular kinds of phenomena are ultimately represented in the data and can thus be studied. If constructs are operationalised with assessment methods (e.g., behaviour ratings), the generated data can reflect only people's psychical representations of individual-specific behaviours but not the behaviours in and of themselves as their investigation requires repeated nunc-ipsum recording of events in many individuals over time (Uher 2013, Desiderata 1d, 1f, 2014a).

Standardised questionnaires—unknown encoding schemes

In contemporary psychology, methods of data generation are frequently chosen according to their status as "standard psychological tools", their availability and/or convenience of use (Omi 2012; Schwarz 2014; Toomela 2009, 2011; Westen 1996). In particular, standardised questionnaire methods are most widely used, yet often with only little consideration of the metatheoretical decisions on which their development rests.

In standardised questionnaire methods, researchers predetermine single item statements and define them as data variables. These items are then presented in a randomised order to respondents who are asked to indicate their assessments of how well a given statement applies to a target individual or how frequently the events described in the statement occur in an individual using fixed answer categories (labelled, e.g., "rarely", "occasionally", "frequently"). However, the psychical procedures by which respondents generate such assessments and select particular answer categories—thus, how they generate the data—are still largely unknown. Microgenetic explorations of self-assessments (e.g., Rosenbaum & Valsiner 2011) have already demonstrated that these processes are highly complex and characterised by respondents' attempts to mentally contextualise the decontextualised item statements and answer categories by interpreting them against their current situatedness. These interpretations necessarily vary intra- and inter-individually. Moreover and importantly, which particular memorised events and phenomena respondents implicitly consider when psychically constructing individual-specificity cannot be specified (Uher 2014a). Thus, the encoding schemes by which the respondents assign particular memorised phenomena and events to the particular items and answer categories provided in the questionnaires are not specified.

The only encoding scheme explicitly known is the researchers' assignment of the fixed answer categories to numerals to obtain "quantitative data" that can be directly entered into statistical analyses. This, however, is just a *recoding* of categories. The actual data generation—the conversion and encoding of perceptions of the qualitative and quantitative

properties of the phenomena and events under study into signs—*rests with the respondents*. But as these conversion and encoding decisions are not explicated, such "quantitative" psychological methods violate basic set-theoretic and algebraic requirements that must be fulfilled for scientific quantification.

With standardised "quantitative" methods, psychologists aim to develop simple and easy-to-use tools that establish intersubjectivity, which is elementary for all sciences. But the simplicity and straightforwardness of neatly standardised data variables and fixed numerical encodings set the researchers' thinking on a dangerous path. Specifically, this *enforced simplicity obscures the complexity of the conversion and encoding decisions* that are inevitably required to fulfil the set-theoretic and algebraic requirements for scientific quantification in explorations of any kind of phenomenon and, in particular, of the highly complex patterns of individual-specificity in psychical and behavioural phenomena (cf. the basic conversion principles that the TPS-Paradigm specifies with regard to each of the three metatheoretical properties that it considers; for details, see Uher 2014a this trilogy). Without explicating these decisions, standardised "quantitative" data, albeit high inter-rater reliability, are of little value as it remains unclear what particular sets of events they actually represent in a given study. Ultimately, within- and between-individual variations—"personality" psychologists' primary objects of research—should also be assumed for respondents' conversion and encoding decisions, making their explication and exploration even more important.

Establishing explicated encoding schemes

The complexity of the conversions of information between different kinds of information and of the encoding schemes required for exploring individual-specificity as well as the difficulties that are entailed by their explicit formulation become apparent in other methods of data generation. In studies exploring individual-specific behaviours, for example, researchers must explicitly define qualitative and quantitative properties of single behavioural acts that are extroquestively perceptible by multiple individuals and must lexically encode these properties in intersubjective ways such that different observers demarcate and categorise behavioural events and encode their occurrences in the same ways as statistically tested by inter-observer reliability. Establishing such encoding schemes for all kinds of phenomena and events that are to be explored in a given study can build on techniques well-established in ethology (e.g., Lehner 1998) and other neighbouring natural science disciplines (cf. Uher 2013, Desideratum 1d) and on many hermeneutic-interpretive methods well-established in the social and cultural historical sciences (e.g., Berg & Lune 2012; Fahrenberg 2002; Flick 2008; Gadamer 1975).

Explicitly defining the encoding schemes used allows researchers to meet the set-theoretic requirements for scientific quantification. For behavioural studies, for example, all studied elements of the set *B* of behaviours, the set *S* of behavioural situations that (may) functionally mediate these behaviours, the set *I* of individuals in which they are studied and the set *T* of occasions and spans of time in which they are recorded are specified, thus fulfilling the set-theoretic requirement for scientific quantification. Using the concept of time-relative probabilities, the thus-obtained contextualised individual behavioural data (i.e., the elements of the sets *B, S* and *I*) are set in relation to the fixed units of physical time during which the behaviours have occurred in a given study (i.e., the studied elements of the set *T*), thus fulfilling the algebraic requirement for scientific ratio-scaled quantifications. Statistical findings and the constructs developed therefrom can thus always be traced to the particular events, phenomena, individuals and time-spans from which they are derived and that they thus reflect (two comprehensive empirical studies with 76 and 146 contextualised behaviour variables respectively are demonstrated in Uher et al. 2008, 2013a).

Explicitly and intersubjectively formulated encoding schemes are also important to establish the *comparability of conversions and encodings* obtained for individuals of different populations or species in which different kinds of events of behaviours and behavioural situations must be studied (Uher 2013, Desiderata 1d, 1f). Importantly, comparability cannot be established a priori by confining the encoding scheme to a fixed set of data variables

(e.g., questionnaire items) and by leaving the generation of these fixed-scheme data and their comparability to unknown conversions and encoding schemes implicitly used by lay people. Instead, comparability can be established only if it is based on explicit decisions made during data analysis and theoretical interpretation (Uher 2014c). Explicating these decisions makes it painfully apparent that the qualitative and quantitative properties that can be perceived in the manifold events occurring even in the same kind of phenomenon often cannot be directly compared with one another and that establishing the comparability of events other than those that are rather identically repeatable (e.g., cells) is always a matter of decision and degree of abstraction. Developing schemes for making these decisions belongs to the core competencies of researchers. It should not be imposed on the individuals who allow researchers to explore them.

For exploring *individual-specificity* in psychical phenomena in and of themselves and in composite kinds of phenomena comprising psychical phenomena (e.g., psychical and semiotic representations of individual-specificity, some contextual phenomena), two encoding schemes must be specified because psychical phenomena can be explored only indirectly through individuals' externalisations. The first encoding scheme must be explicated to explore the physical phenomena that are used as signs by the individuals under study for externalising their psychical phenomena. On the basis of this scheme, possible individual-specific patterns in the individuals' use of these signs can be identified using extroquestive methods, scientific quantifications and quantitative analyses. The second encoding scheme must be explicated to explore how the individual-specific patterns in the use of signs thus-identified may be related to psychical phenomena of the individuals studied. This inherently requires introquestive and hermeneutic-interpretive methodologies. Using such methodologies, possible individual-specific patterns can be reconstructed in people's psychical phenomena and in composite kinds of phenomena comprising psychical phenomena, such as individual-specific patterns in the particular fields of meanings that individuals ascribe to particular signs or to other physical phenomena and events. Both extroquestive and scientific-quantitative methodologies and introquestive and hermeneutic-interpretative methodologies must be selectively combined with one another (further elaborations are provided in Uher 2014c in this trilogy).

Importantly, for valid explorations of the primary conversions of information from the studied individuals' psychical phenomena to their externalisations and for valid explorations of the researchers' (and others people's) inferences from these individuals' externalisations to their psychical phenomena (i.e., secondary conversions of information), researchers must capture these externalisations *in the contexts in which they are made* by the individuals under study (especially real-life contexts), and *without a priori constraining the studied individuals' externalisations* to only particular events (as is the case in standardised questionnaire methods and many experimental methods). This is essential because researchers, as they cannot directly perceive the phenomena under study, cannot become directly aware of whether the variables can appropriately and intersubjectively represent the particular psychical events to be explored. Researchers can consider only whether the variables are appropriate for representing *their own* psychical events—with all the ego-centric biases this may entail. To explore individual-specificity in psychical phenomena and in all composite kinds of phenomena in which psychical phenomena are comprised, researchers must obtain records of *contextualised* behaviours and/or *contextualised* semiotic materials (e.g., textual materials from everyday conversations, interviews, mails or letters). "Personal documents are for the most part introspective protocols, adapted especially to the study of the complexities of phenomenal consciousness" (Allport 1942, p. 37).

In the *first encoding scheme*, researchers explicitly define as data variables, for example, particular lexical signs that occur in the contextualised materials (e.g., single words or groups of words). As these signs are physical and directly perceptible by multiple individuals (i.e., extroquestively accessible), researchers can intersubjectively demarcate and numerically encode their occurrences in a given text (e.g., using textual data analysis Neuman 2014; Reinert 1983, 1990; or methods of computational linguistics, Bolden & Moscarola 2000). As the set of all studied events of lexical signs is specified, their (co-

)occurrences can be directly compared relative to all events contained in the given textual material and/or relative to the time in which they were used, thus enabling scientific quantification (cf. the dictionary-based lexical studies by Lahlou above).

Allport (1965) demonstrated this principle in his analyses of the letters of a woman ("Jenny") in which he explored the frequency with which basic tag words were associated with one another. Similar methods were used in a recent study (Roivainen 2013) to explore how frequently in their everyday lives people actually use the 432 person-descriptive adjectives from which Saucier and Goldberg (1996b) eventually developed their Big Five taxonomy (see below). This question was explored in the vast sample of textual documents available online. The 432 adjectives were defined as data variables; their frequencies were numerically encoded as Google hits for bigrams consisting of adjective+person. Frequencies varied enormously—between adjectives from 51 to 4.2 million (!) and also between 1950 and 2000. These findings raise serious questions on how appropriately "personality" taxonomies derived from standardised questionnaire methods represent people's actual everyday use of "personality"-descriptors (at least as far as online texts are concerned) and thus also people's psychical representations about individual-specificity that may be encoded therein.

By predetermining items, by contrast, researchers force respondents to assess target individuals regarding particular ideas of individual-specificity that they, as researchers, consider to be meaningful. But this need not be the case for the respondents. Even if respondents happen to construct the same meanings for the items as the researchers, the respondents may not yet have developed or considered such ideas, for example, because these ideas may be irrelevant in the respondents' everyday lives (Allport 1937). „In general our besetting sin in personality study is irrelevance, by which I mean that we frequently impose dimensions upon persons when the dimension fail to apply" (Allport 1966, p. 8). But researchers do not even learn about this because respondents' opportunities to externalise *their* ideas are constrained to indicating with a few fixed answer categories only gradual assessments of the *researchers'* ideas. This prevents researchers from finding out about the *ideas that respondents use* in their everyday lives and that the researchers have not considered or consider to be irrelevant. Standardised questionnaire methods therefore entail particularly high risks that researchers introduce serious biases (Lahlou 2011).

The *second encoding scheme* is established for reconstructing, for example, from unconstrained lexical externalisations and textual materials thus-scientifically quantified possible individual-specific patterns in people's psychical phenomena and in composite kinds of phenomena in which psychical phenomena are comprised (e.g., psychical representations of individual-specificity). The quantitative findings obtained from individuals' externalisations are thereby interpreted with regard to potentially associated psychical events (e.g., meanings, ideas of particular kinds of individual-specificity). But importantly, although the interpretations and inferences are made on the basis of scientifically quantified results obtained from individuals' externalisations, scientific quantifications of the psychical phenomena under study are not possible given their "non-physical" properties. Rather, introquestive and hermeneutic-interpretive methodologies are required to establish explicit encoding schemes for the intersubjective demarcation, categorisation and lexical encoding of the externalising events, of the studied individuals' psychical events to which they may refer and that are inferred from them respectively and of the meanings that these psychical events may have for the individuals studied. Therefore, ideally, the individuals whose psychical events, representations and externalisations are under study should be involved (at least partially) so that they can validate the demarcations and encodings made by the researchers (Lahlou 2011; Rosenbaum & Valsiner 2011). The explicit formulation of the encoding schemes used enable intersubjective discussions to reach well-founded consensus not only between researchers and the individuals studied but in particular between researchers within and across research traditions and disciplines (cf. Uher 2013, Desiderata 1d, 3, 6, 7, 8).

These principles of the selective combination of complementary methodologies that are each targeted at specific kinds of phenomena allow researchers to explore individual-specificity in psychical phenomena, semiotic representations, artificially modified outer

appearances and in contextual phenomena in which psychical phenomena are comprised. This enables taxonomic "personality" researchers, for example, to reconstruct individual and socially shared representations of individual-specificity and to explore the ways in which these psychical phenomena are lexically encoded by particular individuals and communities.

3) Metatheoretical rationales of reduction principles

The idea behind taxonomic models is to provide parsimonious summary descriptions that appropriately represent elementary structures of highly complex phenomena, events and their internal relations. The TPS-Paradigm refers to *reduction principles* as the operations and practices that researchers apply to reduce large numbers of selectable events in the phenomena under study (see 1. Classes of selection approaches) and to reduce empirical data sets in which the selected phenomena and events are encoded (see 2. Methods of data generation). Thus, these principles refer to reductions of variables and empirical data, not to theoretical reductions (cf. Fahrenberg 2013).

Importantly, reduction principles must be *matched to the phenomena under study*; it is solely these phenomena's metatheoretical properties that determine which formal-logical operations are appropriate to explore their internal relations—and not the properties of the *phenomena by which they are semiotically represented* for the purposes of exploration (e.g., variables, data; Uher 2013, Desideratum 1e; cf. also Toomela 2011). Reduction principles influence which kinds of phenomena are ultimately reflected by the derived taxonomies and how representative these taxonomies are (Shweder & D'Andrade 1980). Various reduction principles can be distinguished by their underlying metatheoretical rationales.

Non-statistical reduction principles

"Personality" taxonomists have employed numerous non-statistical reduction principles. Here, only a few shall be illustrated by the example of decontextualised studies that are based on lexical physical system approaches in which the universes of events to be reduced is explicitly known. The vast number of person-descriptors in the lexica often necessitate non-statistical reductions to a size manageable for data generation. For example, Allport and Odbert (1936), pioneers of decontextualised lexical "personality" research, categorised together with a third person the 17,953 person-descriptive words of the English dictionary into four major categories (labelled "lasting personal traits", "temporary states", "social evaluations", "miscellaneous terms"). Their dyadic inter-judge agreement in these categorisations, analysed in a sub-sample of 300 words, ranged between 41-54% per category; their estimated chance agreement was 6.25%. Allport and Odbert also explicitly interpreted these results in the light of their own ego-centric biases.

> "This result is the direct outcome of the tendency of each judge to have a favorite column [i.e., category] to which he assigns more terms than do the others."
> "Nothing like perfect agreement should be expected. Much depends upon the linguistic habits of each individual judge. Even if he has recourse to the dictionary he is often forced to choose arbitrarily between several possible shades of meaning to guide his placement" (Allport & Odbert 1936, p. 35, 34).

The categorisation made by these three scientists formed the basis for numerous taxonomic English-language studies (e.g., by Cattell, Fiske, Tupes & Christal, Norman, Digman, Goldberg, Wiggins; for an overview, see John et al. 1988). Raymond Cattell (1943), for example, in the course of developing his 16 Personality Factor Taxonomy (16PF), used various non-statistical principles to reduce Allport and Odbert's list before applying statistical principles (see below). First, as he was interested in stable "traits", he selected only the terms of their first category (to which he added, based on his own nominations, some 100 temporary-state terms, which were likely contained in the second category, cf. above). To form clusters, Cattell then obtained judgements from two persons (one presumably himself) about the *semantic similarity* of these terms but without providing inter-judge agreement scores. Within the synonym clusters, Cattell formed "intuitive pairings" of *bipolar opposites*

that John and colleagues (1988, p. 179) describe as “difficult to evaluate” in their “appropriateness”. Cattell reduced the resulting 160 mostly bipolar clusters by selecting about 13 clusters and summarising them with a key term. He also eliminated some clusters without explicit explanation (and added some further terms and constructs from the psychological literature, see above; for details, see John et al. 1988).

Reduction by semantic similarity or dissimilarity, whether individually judged or lexicographically documented, is used by many taxonomists (Saucier & Goldberg 2002). But this reduction principle is deeply surprising given that lexical “personality” researchers using decontextualised approaches aim to identify the “most important individual differences” based on the assumption implied by the lexical hypothesis that “the degree of representation of an attribute in language has some correspondence with the general importance of the attribute” (Saucier & Goldberg 2001, p. 849). Thus, to identify what people consider the “most important individual differences” in their everyday lives, should not researchers rather study the number of synonyms and antonyms that are lexicographically documented in a language rather then filtering them out in an early step of taxonomy development? This question can be explored using statistical context-based reduction principles (see below).

Further reduction principles are based on, for example, selecting only adjectives, nouns, adverbs or verbs (Saucier & Goldberg 1996a), only terms categorised as describing dispositions or also those categorised as describing states (Saucier 1997); excluding particular content-domains, such as attitudes, values, anatomical and physical characteristics, health and sexuality; or selecting person-descriptive terms from just every fifth or tenth page of the lexicon (Goldberg 1982; Norman 1967; Saucier & Goldberg 1998; Schmitt & Buss 2000; Tellegen 1993). “Norman, Goldberg, and Wiggins all started from essentially the same set of trait terms yet their taxonomies are remarkably different, both in their general structure and in the specific details” (John et al. 1988, p. 198). This indicates that the differences between taxonomies developed for the same language with decontextualised approaches are not derived from their underlying strategy-based selection principle but from the non-statistical reduction principles employed by different researchers.

It is striking that these first important reduction steps are based on decisions made by just a few persons, mostly the researchers themselves, who thereby introduce particular risks for anthropo-, ethno- and ego-centric biases on their part. Influences of the researchers’ own metatheoretical assumptions about what they conceived of as “personality”—and what not—on the particular reduction principles that they devised are obvious in many cases and also often stated explicitly. Allport (1937) and Norman (1967), for example, justified their exclusions of terms that are evaluative and related to physique and health (amongst others) based on their concept of “personality traits” as enduring characteristics, internal to the individual and causally effective.

The risks for biases introduced by non-statistical reduction principles are rarely considered because they occur in the process of defining data variables, thus prior to the actual generation and encoding of data. But non-statistical reductions restrict what can be encoded at all. Such biases must also be carefully considered in studies exploring other kinds of phenomena. Studies exploring psychical and composite kinds of phenomena are at particular risk because the “non-physicality” and internality of psychical phenomena precludes their perception by multiple individuals. Thus, direct tests of the appropriateness of the selected data variables to represent the events under study are not possible as they are possible for investigations of physical phenomena such as behaviours.

Statistical redundancy-based reduction principles

Psychologists have developed numerous statistical methods to explore and model patterns underlying large sets of data, especially numerical data (e.g., factor analyses). Data sets are matrices of data variables into which occurrences of (defined) events are converted and encoded for individual cases. Importantly, statistical methods work without knowledge of the meaning behind the variable; it is the researchers’ task to decide if the statistical procedures performed on the encoded data are appropriate for the particular metatheoretical properties of the *phenomena and events that are represented by the data sets*.

Most “personality” taxonomies were developed statistically from numerical data sets that were generated with standardised questionnaires on which respondents encode graded assessments of statements that were selected according to the researchers’ theoretical ideas. Regardless of the fact that the particular information and meanings that respondents may aim to convert and encode into these assessment data cannot be specified, thus precluding scientific quantifications and hence applications of statistical algorithms for ratio-scaled data, these data create further profound issues for taxonomy development because they are generated in *decontextualised* ways. That is, respondents must generate, based on memory and imagination, assessments of predetermined brief statements that are presented separately in a mostly randomised order. Co-variations in the thus-generated data can therefore reflect only similarities/dissimilarities—i.e., *redundancies*—in the meanings that respondents construct for the predetermined item statements; for example, based on semantic similarity (Block 2010; D’Andrade & Shweder 1980) or on the connotations that respondents attribute to particular meanings (e.g., valences; Uher et al. 2013b).

Redundancy is the central principle underlying standardised questionnaire scales. Besides some content-related decisions (cf. selection approaches), their construction is primarily based on “psychometric” criteria that are derived from measurement and test theories (e.g., classical or probabilistic test theory; Kaplan & Saccuzzo 2010; Saucier & Goldberg 2002). For example, from the selection of lexical items obtained in previous reduction steps, researchers construct item statements that describe similar attributes and their opposites to obtain sets of homogeneous balanced keyed items because this is needed for statistical reasons. Iterative processes of item selection, data generation and data analysis exclude those items that fail to reliably generate data with particular distribution patterns in a given sample (e.g., normal curve distribution) and/or that generate the least homogeneous data structures. These exclusions are made to maximise the statistically defined internal consistency of sets of items and to obtain “desirable” statistical structures in the data that can be generated with these sets of items (e.g., factor-analytical structures). In factor analyses, for example, items showing high loadings on a given factor and low loadings on other factors are selected, whereas items producing loadings on multiple factors are eliminated to construct sets of item statements with which mutually orthogonal data distributions can be generated to facilitate interpretation. The particular numbers of factors that can be constructed this way result primarily from the researchers’ decisions about the number and diversity of data variables selected and about how strongly the data that can be generated with these variables should be reduced (e.g., on a lower level of summarisation, various more specific homogeneous sub-factors or facets are constructed for each given factor).

In sum, to construct standardised questionnaires, psychologists select data variables by which data that match assumptions of specific measurement theories can be generated and they discard all those variables that produce data that do not match. Hence, the very generation of data is radically matched to pre-existing statistical theories. A matching to the metatheoretical properties and the occurrences of the actual phenomena and events under study cannot and does not take place. This introduces considerable biases of which psychologists seldom become aware because the sophisticated statistical theories and analyses used for standardised scale construction give these reduction principles a profound theoretical underpinning—that, however, can have only little to no correspondence to the properties of the psychical phenomena under study. It is certainly not by chance that only psychologists have developed such radical methods to influence their primary data generation by constructing data variables based on the very results that these variables produce: The “non-physicality” and internality of psychical phenomena preclude direct tests of the appropriateness of conversions and encoding schemes used as is possible in research on physical phenomena such as behaviours (as explored in detail in Uher 2014c in this trilogy).

The metatheoretical rationales underlying statistical redundancy-based reduction principles challenge assumptions about the representativeness of many currently popular “personality” taxonomies, most of which were derived from standardised questionnaire data

(Block 2010; Uher 2013, Desideratum 1e). The recent finding that the person-descriptive adjectives from which a popular "personality" taxonomy was developed are actually used by people as dramatically different as between 51 and 4.2 million (at least in textual online documents; Roivainen 2013) may provide a first idea about the magnitude of possible biases that may be contained in currently popular "personality" taxonomies. These serious limitations were already recognised by many scholars (e.g., Block 1995, 2010; Eysenck 1992; McAdams 1992; Shweder & D'Andrade 1980, Westen 1996), among them the founder of American „personality" psychology, Gordon Allport, who wrote half a century ago:

> "As for factors, I regard them as a mixed blessing. … My principal question is whether the factorial unit is idiomatic enough to reflect the structure of personality as the clinician, the counselor, or the man in the street apprehends it. Or are factorial dimensions screened so extensively and so widely attenuated—through item selection, correlation, axis manipulation, homogenization, and alphabetical labeling—that they impose an artifact of method upon the personal neural network as it exists in nature?" (Allport 1966 p. 3).

It must be concluded that "personality" taxonomies statistically derived *from data generated with standardised questionnaire methods* cannot reflect the individual differences that are most important in everyday life as stated in the lexical hypothesis. Instead, they can reflect only redundancies that respondents construct *for the researchers' particular choice of item statements* in which the redundancies that people encode in their natural everyday language were often eliminated a priori but into which other redundancies were artificially introduced for the mere sake of matching measurement-theoretical assumptions.

Statistical context-based reduction principles

To develop parsimonious summary descriptions that appropriately represent basic structures of highly complex phenomena and their internal relations, contextualised approaches are required. Specifically, researchers must carefully adapt their encoding schemes both *to the phenomena and events under study and to their occurrences* in the individuals studied, rather than a priori constraining the encoding of events and even their very occurrences according to predefined fixed encoding schemes. This basic principle becomes more directly apparent in explorations of phenomena that are extroquestively accessible. In behavioural studies, for example, researchers often predefine data variables for encoding behavioural events that they *expect* to occur. But during the reliability training of the observers or video-coders—i.e., prior to the actual data generation—the researchers *adapt and modify* their encoding schemes to appropriately capture the behavioural events as they occur in the individuals under study because some behaviours may not occur at all and other behaviours may unexpectedly occur instead (Uher et al. 2013a).

Contextualised lexical studies rely on the same principle. They explore lexical materials in which the *studied individuals* decide which particular lexical encodings can most appropriately represent their psychical events and constructed meanings in intersubjectively shared ways as well as the (co-)occurrences of these psychical events. In textual materials (e.g., obtained from free response formats, conversations, dictionaries), the internal structures that people (implicitly) construct for lexical encodings in their everyday language are maintained. This is essential for reconstructing not only the implicit structures in people's lexical systems, but also for reconstructing from these lexical patterns potential patterns in the experiencings and psychical representations that people may have intended to lexically encode. In contrast, by asking individuals to respond to predetermined items statements presented in a randomised order and by reducing their opportunities to respond to a few fixed categories on standardised questionnaires, researchers enforce the occurrences of particular events (e.g., psychically constructed ideas, [ticked] lexical encodings) that otherwise would not necessarily have occurred in the individuals studied and/or in the constellation predetermined by the researchers. This disruption—i.e., *decontextualisation*—of lexical encodings makes it impossible to reconstruct either the implicit lexical structures or

the potential psychical structures encoded therein (as successfully demonstrated in the contextualised lexical studies by Lahlou and Laucken; cf. Uher 2013, Desiderata 4, 5).

In contextualised studies, statistical methods can be fruitfully applied to explore and model the internal relations and latent structures of complex phenomena and events *as they occur in or are used by the individuals studied*. For example, to explore implicit structures underlying people's actual use of person-descriptors in their everyday lives, textual materials are statistically analysed for latent patterns in the co-occurrences of lexical terms as comprehensively demonstrated by Lahlou (1996a, 1998, 2001) in his analyses of dictionary definitions of all synonyms of "to eat". The textual corpus that he compiled from all definitions (except for rare terms, see above) comprised 137,567 words and was first processed with textual analysis software (ALCESTE; Reinert 1983, 1990). The software broke the textual corpus down into 1,220 statements (e.g., sentences), excluded function words (e.g., articles, prepositions) and statements occurring only rarely, and reduced all remaining words to their lexical roots (i.e., lemmatisation; e.g., verbs to their infinitive form). The remaining 877 lexical statements were statistically analysed for co-occurrences of the lexical elements that they comprised based on a table crossing sentences and elements. The lexical elements were classified into clusters by the principles of analogy (closeness) and contrast (difference) using quantitative mathematical algorithms (descending classification) derived from multivariate analysis techniques (PCA, dynamic clouds). These analyses yielded semantic classes of statements with similar lexical content. These classes and their interrelations can be interpreted as reflecting basic concepts that are psychically associated in socially shared ways by the individuals of the socio-linguistic community studied (Abric 1984, 1993).

As these methods are based on mere computational analyses of co-occurrences of lexical elements in textual data, they are free from biasing preconceptions because there is no reduction of the materials to be analysed based on the researchers' interpretations and explicit or implicit theoretical ideas and there is no selection of lexical variables based on test-theoretically desirable patterns of data that can be generated with them. These methods are detailed quantified content analyses that, given their computerisation, enable efficient large-scale explorations of textual data that are hardly accessible with qualitative techniques and that have yielded robust results in different sets of textual data (e.g., dictionary entries, free-responses in questionnaires and in interviews; Lahlou 1996b, 1998, 2001).

Methods based on statistical context-based reduction principles will be essential key methods for contextualised explorations of people's psychical constructions and representations of individual-specificity as encoded by their everyday languages. They will allow lexical "personality" researchers to quantitatively explore people's everyday language for redundancies that, according to the lexical hypothesis, reflect the importance and salience that the denoted phenomena and events have for the individuals studied. In addition, these methods will enable explorations of the implicit structures of people's psychical representations of individual-specificity and their interrelations as encoded by people's everyday language. Specifically, they will enable straightforward analyses of the dictionary definitions provided for all person-descriptors in Webster's most recent English-language edition—and for all 17,953 person-descriptive words that Allport and Odbert have selected from Webster's 1925 edition. This will enable particularly illuminative contrasts with all taxonomic models that were (directly or indirectly) developed from these English lexica using standardised questionnaire methods. Next to online documental sources, the increasingly digitised communication in everyday life (e.g., email, social networks) and at work (Lahlou, Nosulenko & Samoylenko 2012) provides highly illuminating opportunities to explore the implicit structures underlying people's actual use of their everyday language in different domains of life and to reconstruct therefrom individual-specific or socially shared structures of psychical representations about individual-specificity that are encoded therein (cf. Uher 2013, Desiderata 1e, 4, 5, 9).

Statistical context-based reduction principles also enable explorations of data sets in which other kinds of phenomena, such as behaviours, are encoded by researchers in contextualised ways. This is the case in the log files obtained from nunc-ipsum methods in which researchers register events of behaviours and behavioural situations that are sampled

from the sequential streams in which they occur in the individuals being studied. In such data sets, "repeated segments" of behavioural events that co-occur frequently in temporal proximity (but not necessarily in fixed sequences) or in particular constellations of behavioural and situational events in some or many individuals can also be explored with textual data analysis software such as ALCESTE (Calatayud, Montaudouin, Le Pape & Bellengier 2006; Le Pape, Reinert, Blois-Heulin & Belzung 1997).

Statistical function-based reduction principles

Particular challenges occur in taxonomisations of individual-specificity in species-specific behaviours because their diversity of possible events—compared to the diversity of semiotic behaviours (e.g., gestures)—is limited and occurrences of different behaviours that have the same or similar functions (and thus, meanings) in a given species may be constrained because maintaining redundancies is too costly from an evolutionary-biological viewpoint (Uher et al. 2013a). In semiotic representations (e.g., semiotic behaviours, language), by contrast, redundancies can emerge more frequently because they comprise *a)* psychical phenomena in which, given their "non-physical" properties, the diversity of events is generally unlimited and opportunities for constructing redundancies at low cost are high and *b)* events of physical phenomena in which redundancies can be artificially created (i.e., phonemes, morphemes), likewise at comparably low cost (Lahlou 1996b; Uher 2013, Desideratum 1e).

Specifically, one may expect that different behaviours that behavioural scientists assign to the same category based on their shared functionality (e.g., different behaviours of contact and non-contact aggression) may also show similar patterns of occurrences in individuals, thus resulting in coherent patterns of stable individual differences in these behaviours that could be summarised by the same construct of individual-specificity (e.g., "aggressiveness"). But correlations of individual-specific patterns between functionally similar behaviours are often only moderate or even missing altogether. In adult humans, for example, individual differences in gaze aversion, long pauses in speech, hesitant speaking and restricted gestures in social situations, all commonly interpreted as "shy" behaviours, showed only low to moderate correlations with each other (Asendorpf 1988). Zoo chimpanzees, prior feeding, show various behaviours that indicate arousal (e.g., rocking, vocalising, pacing, scratching), but which of these behaviours an individual frequently shows is highly individual-specific so that stable differential patterns in these behaviours do not inter-correlate on the sample level (Uher 2011b). Moreover, occurrences of the same kind of behaviour across different kinds of behavioural situations are often highly individual-specific so that the cross-situational consistency of stable differential patterns in a particular behaviour is often only moderate (Mischel 1968, 1977; Uher 2011a, 2011b).

Child ethologists presented thoughtful taxonomic analyses of individual variation and temporal clustering in very comprehensive data sets of individual behaviours in preschoolers obtained from detailed observations. They repeatedly reported that the factors emerging from factor-analyses accounted for only low to moderate percentages of the variance in the data (Blurton Jones 1967, 1972; Smith 1973; Smith & Connolly 1972, 1980). Importantly,

> "… cross-individual analysis suggests that the main dimensions of individual variation cut across the temporal groupings of behaviour. All the children seem to show the same groupings but children do not differ mainly in the frequency with which they show behaviour in each group. Normal children vary in how much of any form of social behaviour they show …" (Blurton Jones 1972, p. 124).

In their studies in adults' expressive movements, Allport and Vernon (1933) similarly reported on "intrinsic statistical inadequacies in the statistical treatment of consistency" in behavioural data (p. 47). These well-known findings reflect the fact that in momentary and highly fluctuating phenomena that are dynamically interrelated to various other kinds of phenomena, as is the case for behaviours and experiencings, within- and between-individual variations reach degrees of complexity in which simple regular structures that could explain

much of the variations observed cannot be found (for details, see Uher 2014c in this trilogy). The idea underlying taxonomic and especially statistical modelling of these variations rather arises from the conscious workings of human minds and their limited capacities leading to the human tendencies to seek regular and simple patterns (cf. the law of least effort, Royce 1891). But despite some inherent inadequacies, in the face of the complex phenomena encountered in life and a still uncertain future, the human ability to (re)construct simple recurring patterns could be useful for providing some orientation in everyday life and for predicting future events (Kelly 1955; Valsiner 2012).

Given that within- and between-individual variations in behaviour are so complex that meaningful taxonomic constructs often cannot be derived from mere statistical co-occurrences, the BR_xBS-Approach comprises a two-step function-based reduction principle. In a first step, the data are statistically reduced according to the scientifically established functions of the behaviours studied. Thus, regardless of potentially low internal consistencies among the contextualised behavioural variables assigned to the same behavioural category and their (commonly) only low to moderate cross-situational consistency, *functionally defined composite measures* of individual-specificity are computed on the level of the BR_xBS-Approach-generated working constructs. In a second step, the thus-derived composite construct measures, rather than the raw behavioural data, are subjected to statistical analyses using redundancy-based or context-based reduction principles. For example, taxonomic structures of individual-specificity can be explored using correlational analyses of the composite construct measures (for an empirical demonstration, see Uher et al. 2013b).

The first step is necessary as, in behavioural studies, opportunities for homogenising sets of data variables by excluding and creating variables that produce a test-theoretically optimal data fit are generally very limited. This is not only because redundant events are rare, but also because, in observational and also in experimental studies, specific behavioural events cannot be reliably elicited on demand as is possible with asking people to make checkmarks on standardised questionnaires. Moreover, behaviours that are commonly considered to be most indicative of a given construct of individual-specificity may also occur least homogeneously with the occurrences of other behaviours of similar function (e.g., contact-aggression behaviours, which are commonly considered to be most indicative of “aggressiveness”, often do not correlate well with non-contact aggression behaviours; Uher et al. 2013b). For this reason, the comprehensive and systematic selection of behaviours and behavioural situations from the established behaviour-scientific knowledge base and their targeted investigation are central elements in the BR_xBS-Approach.

This function-based reduction principle corresponds to intuitive processes of mental abstraction on the part of observers who convert and encode perceived behavioural events into particular categories. In the continuous flow of behaviours, demarcating and encoding single events into defined categories always requires decisions on the part of the encoders (Uher 2011b). If the coding categories are more specific and homogeneous, rather than more abstract and heterogeneous, the decisions for higher abstractions from observable events—which are largely based on the behaviours’ functionality and meaning rather than on their observable physical similarity—can be made *explicit* during data analyses and can thus be traced to the more specific sets of events that they summarise (cf. Uher 2013, Desiderata 1e, 1f).

The function-based reduction principle can therefore also be used to explore people’s socially shared psychical representations of individual-specific behaviours that they develop from (everyday) observations. Such analyses were demonstrated in a 3-year-6-wave study of 104 captive crab-eating macaques and their 99 human observers, both experts and novices. The BR_xBS-Approach was applied to generate functionally-defined constructs of individual-specific behaviours in this monkey species for which the observers generated first behavioural data using nunc-ipsum methods and thereafter, the same observers generated assessment data using standardised questionnaires. Using the two-step function-based principle, both data sets were first reduced on the level of the BR_xBS-Approach-generated constructs. On this level, direct contrasts between the two data sets revealed that the assessments reflected various attribution biases likely derived from age-, gender- and

status-related stereotypes *about human individuals* and from social valences commonly attributed to particular behaviours that are implicitly encoded in pertinent lexical terms (e.g., "aggressive", "friendly")—thus, reflecting anthropocentric biases. In a second step, the taxonomic structures of the composite measures were explored in the two data sets using correlational analyses and showing that the assessments reflected much simpler and more consistent structures than could be found in the monkeys' behaviours (Uher et al. 2013b; cf. Uher 2013, Desideratum 8).

Reducing between-individual and within-individual variations—averages, variabilities and ranges

The generation of data with more specific and contextualised variables and the use of occurrence- and function-based rather than mere result-oriented reduction steps also enables analyses on the levels of specific events. For example, in both humans and nonhuman species, individual-specific patterns in behaviour have repeatedly been shown to be particularly pronounced on the levels of specific behaviours and of specific behavioural situations (as explored, e.g., with the concepts of individual-specific behaviour-profiles and individual-specific situation-behaviour-profiles; Asendorpf 1988; Mischel, Shoda & Mendoza-Denton 2002; Uher 2011b). Individual-specificity also emerges in the temporal stability of individual patterns over both intermediate and longer periods of time (Caspi & Roberts 1999; Uher et al. 2013b). If data encoding and/or data analysis occurs on only more abstract levels as is commonly the case in previous taxonomic "personality" research, much of this variation is averaged out, thus obscuring illuminative patterns of individual-specificity.

"Personality" taxonomists must therefore also decide *what kind of individual variation* to analyse and taxonomise. Specifically, in momentary and fluctuating phenomena (e.g., experiencings and behaviours), within-individual variabilities are particularly pronounced. These variabilities reflect the processual nature of these phenomena rather than only random and measurement error variation (van Geert & van Dijk 2002). In fact, researchers should consider that in measurements of dynamic and fluctuating phenomena, high temporal reliabilities and internal consistencies, as required for standardised "psychometric" scales, may not be found (Uher et al. 2013b); rather, high reliability and consistency could "actually be evidence of measurement *invalidity"* (Little 2000, p. 82). Taxonomic explorations of the ranges and patterns of variability in the occurrences of particular kinds of events within and between individuals are therefore particularly illuminating—and in fact essential—for exploring the functioning and development of individuals and their "personality" (Thelen & Smith 1993; Uher 2013, Desiderata 8, 9; Valsiner 2000). Specifically, explorations of individual-specificity in compositional structures and in process structures require the development of different kinds of taxonomies. These issues and the particular fallacies that can occur in the researchers' interpretations of the particular kinds of individual variation, kinds of structures and kinds of phenomena that are represented in the results obtained are explored in the third article in this trilogy (Uher 2014c).

Summary

The TPS-Paradigm for Research on Individuals (Uher 2014a) was applied to explore the metatheories and methodologies that researchers use to study individuals by analysing taxonomic "personality" research as an example. Focussing on some currently popular "personality" taxonomies, the article scrutinised the specific metatheories and methodologies that researchers have previously used to develop comprehensive taxonomic models of individual-specificity. The analyses revealed frequent mismatches between the researchers' explicit and implicit metatheories and the abilities of previous methodologies to capture the particular kinds of phenomena towards which they are targeted.

Many, if not most, of the mismatches identified likely derive from widespread but erroneous assumptions that lexical symbols (e.g., everyday language words, questionnaire items) could directly reflect or at least correspond to the phenomena and events that they denote. This is possible only for physical events that are directly perceptible without reflection but not for abstract ideas such as constructs of individual-specificity, which

inherently refer to temporal, differential and often also probabilistic patterns, which cannot be directly perceived. Hence, lexical encodings denoting individual-specificity can reflect only theoretical constructs but not the phenomena and events, in and of themselves, in which individual-specificity is constructed by abstracting from many events perceived in many individuals over time.

These erroneous assumptions were shown to have influenced researchers' decisions in all three steps of taxonomy development: in *1)* the approaches used to select phenomena and events to be studied, *2)* the methods used to generate data and *3)* the reduction principles used to extract the "most important" variants of individual-specificity and to construct taxonomies. Specifically, these erroneous assumptions may have contributed to the primary application of content-based selection principles, which largely rely on the researchers' or other persons' ideas of individual-specificity. By contrast, strategy-based selection principles, which eliminate this necessity, were previously applied only in lexical physical system approaches. But these approaches are explicitly targeted at exploring people's lexically encoded psychical representations of individual-specificity. The article introduced the strategy-based BR_xBS-Approach, which allows researchers to comprehensively taxonomise both individual-specificity in behaviours and people's pertinent psychical representations. In addition, it outlined ways to (further) develop other strategy-based approaches that allow researchers to comprehensively taxonomise individual-specificity in the other kinds of physical phenomena as well that are explored in research on individuals.

The article furthermore highlighted that decontextualised methodologies prevail in all steps of taxonomy development, specifically, in the lexical selection approaches previously used, and in the standardised questionnaire-based methods of data generation and the "psychometric" reduction principles that have become established standard methodologies in psychology. By elaborating on their metatheoretical foundations, the article showed that decontextualised methodologies are radically matched to the researchers' preconceived ideas of "personality" and to pre-existing statistical theories rather than to the particular phenomena and individuals under study. These findings raise serious doubts about the ability of previous taxonomies to reflect in valid and comprehensive ways the phenomena and events towards which they are targeted and the structures of individual-specificity occurring in them. Basic principles of contextualised methodologies that meet the requirements identified were elaborated in all three steps of taxonomy development. Their applications were illustrated with empirical examples that provided the first insights into the biases and their potential magnitudes that decontextualised methodologies may have introduced to previous taxonomic "personality" models.

Concluding, erroneous assumptions about the abilities of particular methodologies to appropriately represent individual-specificity in targeted phenomena and the radical matching of methodologies to researchers' preconceived ideas and pre-existing statistical theories have seriously hampered comprehensive taxonomic investigations of individual-specificity. The article presented ways in which suitable methodologies can be applied and (further) developed to establish taxonomic models that are able to provide comprehensive accounts of individual-specificity in all of the various kinds of phenomena explored in individuals.

The third article in this trilogy (Uher 2014c) explores the metatheoretical assumptions underlying researchers' theoretical interpretations of the thus-obtained models, constructs and data regarding the phenomena that these represent. The philosophy-of-science analyses reveal frequent mismatches and serious deficiencies in the methodologies previously used that likely derive from widespread erroneous assumptions that are rooted in everyday thinking and that have effectively prevented psychologists from taxonomising individual-specific experiencing, behaviour and functioning. Basic epistemological concepts that are elementary for identifying not only compositional structures of individual-specificity in the various kinds of phenomena but also for process structures of individual functioning and development are discussed and specific methodological principles elaborated. The article will offer novel insights about the various kinds of taxonomic models that are required to

comprehensively explore individuals and their "personality". The insights gained from the metatheoretical elaborations also reveal that psychologists still have some way to go to complete elementary investigations and taxonomisations of all of the different kinds of phenomena and the different kinds of variations and structures in them that are conceived of as "personality".

The insights gained in this trilogy from transdisciplinary and philosophy-of-science perspectives show that explicit formulation and critical reflection on the philosophical and metatheoretical assumptions made by researchers are essential for mastering the intricate challenges that researchers of individuals and of "personality" face because researchers themselves are always individuals with their own particular "personality".

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