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What is behaviour? And (when) is language behaviour?
A metatheoretical definition

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Abstract

Behaviour is central to many fields, but metatheoretical definitions specifying the most basic assumptions about what is considered behaviour and what is not are largely lacking. This transdisciplinary research explores the challenges in defining behaviour, highlighting anthropocentric biases and a frequent lack of differentiation from physiological and psychical phenomena. To meet these challenges, the article elaborates a metatheoretical definition of behaviour that is applicable across disciplines and that allows behaviours to be differentiated from other kinds of phenomena. This definition is used to explore the phenomena of language and to scrutinise whether and under what conditions language can be considered behaviour and why. The metatheoretical concept of two different levels of meaning conveyed in language is introduced, highlighting that language inherently relies on behaviours and that the content of what-is-being-said, in and of itself, can constitute (interpersonal) behaviour under particular conditions. The analyses reveal the ways in which language meaningfully extends humans' behavioural possibilities, pushing them far beyond anything enabled by non-language behaviours. These novel metatheoretical concepts can complement and expand on existing theories about behaviour and language and contribute a novel piece of theoretical explanation regarding the crucial role that language has played in human evolution.

Key words:

Behavior; language; semiotics; nonverbal communication; meaning transmission; questionnaire method.

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Behaviour is at the heart of many fields in the life sciences, social sciences and psychology. But despite its importance and numerous long-standing traditions of behavioural research, many standard works and text books refrain from defining their central object of research (e.g., Hinde, 1966; Tinbergen, 1963). Among the few definitions provided, many are surprisingly imprecise or apply to only particular kinds of behaviours or species (e.g., “everything an animal does and how it does it”; Campbell & Reece, 2005). The lack of a consensual definition has increasingly become a topic of discussion and has been traced back to the fact that, because behaviour is so pervasive and intrinsic to everyday life, researchers often seem to rely more on their intuitive understanding than on scientific definitions (Bergner, 2011; Furr, 2009a; Levitis, Lidicker, & Freund, 2009).

The lack of an established scientific definition of behaviour may also contribute to the diversity of methods used for studying behaviour. Biological disciplines strongly rely on observations and technology-based methods for measuring and tracking (primarily animal) behaviour. Psychological and social science disciplines, by contrast, largely rely on assessment and self-report methods for studying (primarily human) behaviour (e.g., questionnaires and interviews), whereas observations are much less frequently used.

Increasingly, however, psychologists are criticising their own discipline for having developed into a largely questionnaire-based science—a “science of self-reports and finger movements” (Baumeister, Vohs, & Funder, 2007)—and advocate for (re-)establishing psychology as a “truly behavioural science” (Furr, 2009a). This claim has stimulated various controversies on the definition, relevance, and measurement of behaviour in psychology (e.g., Funder, 2006; Furr, 2009a,b and Peer Comments). Specifically, the standardised questionnaires, inventories and tests used in psychology and the social sciences rely on individuals’ behavioural responses (e.g., ticking answer categories) that can be readily ascertained. Scientists do not analyse these responses (“finger movements”), however, but rather the content that is being conveyed in the questionnaire statements and answer categories. Thus, language is fundamental to methods of assessment and self-report.

But are language and behaviour phenomena of the same kind? Can language be considered a special kind of behaviour unique to humans? The many theories concerned with differentiating language from non-linguistic expressions indicate that scientists do conceive fundamental differences (e.g., Knapp & Hall, 2010; Pike, 1954; Wiener & Mehrabian, 1968). But what actually is behaviour? A metatheoretical definition of behaviour that specifies the most basic assumptions about what is considered to be a behaviour and what is not and that is applicable across disciplines can open up new perspectives to scrutinise whether and under what conditions language can be considered behaviour and why.

This research explores these issues by applying the *Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm)*. This novel paradigm is particularly suited for such explorations because it is targeted toward making explicit and scrutinising the most basic assumptions that different disciplines make about research on individuals. First, some of the foundations of the paradigm that are relevant for this research are introduced. Then five definitions of behaviour from different disciplines are presented and explored for their underlying assumptions. These metatheoretical analyses highlight major challenges and reveal that definitions of behaviour often focus on explanatory concepts but fail to specify defining properties of the definiendum in and of itself, thus leading to circular explanations of behaviour. Considering these findings and building on a definition from the field of philosophy, the article elaborates a metatheoretical definition of behaviour and specifies defining criteria and central concepts. These foundations are then used to meta-theoretically explore the phenomena of language and to scrutinise whether and under what conditions language can be considered to be behaviour and why. Novel concepts are elaborated that can meaningfully complement and expand on existing theories about language and behaviour.

The Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals (TPS-Paradigm) – some relevant foundations

The TPS-Paradigm is a paradigm because it comprises interrelated philosophical, metatheoretical and methodological frameworks. It is transdisciplinary because in these frameworks, concepts, approaches and methods from various disciplines were systematically integrated, advanced and complemented by novel ones. It is a philosophy-of-science paradigm because it is targeted toward making explicit and scrutinising the philosophical assumptions that different disciplines make about research on individuals and that underlie the metatheories and methodologies used for explorations (Uher, 2011a, 2013, 2015a,b,c,d,e, 2016).

In its philosophical foundations, the TPS-Paradigm explicitly considers that all research is done by humans and that, consequently, all scientific endeavours are inextricably entwined with and thus limited by humans' perceptual and conceptual abilities. It therefore defines as a *phenomenon* anything that humans can perceive or can make perceptible (e.g., using technical means) and/or that humans can conceive of—a notion that differs from various philosophical traditions of thought¹ (Uher, 2015a).

Three metatheoretical properties

At the core of its metatheoretical framework, the TPS-Paradigm considers² *three metatheoretical properties* that can be conceived in different forms for each given

¹ The notion of the term phenomenon used in the TPS-Paradigm differs from various historical thought traditions in which phenomena are conceived of as mere sensory perceptions and are differentiated from non-sensory concepts (sometimes called noumena; e.g., Kant, 1781).

² The presuppositions that the TPS-Paradigm makes about the three metatheoretical properties and the distinctions between various kinds of phenomena need not be consensually shared by all scientists. Scientists who do not agree or who agree only partially with these presuppositions must

phenomenon. These particular properties are considered because they determine a given phenomenon's perceptibility by humans in everyday life—and thus also by researchers. These properties are 1) *spatial location in relation to the intact body of the individual under study* (e.g., internal, external), 2) *temporal extension* (e.g., momentary, temporally extended) and 3) *spatial extension*, conceived in terms of the two complementary properties *physicality* (i.e., spatially extended) versus "*non-physicality*"³ (i.e., without spatial properties). Importantly, these three properties are conceived on levels of abstraction that are commonly not considered in everyday life and most research. But because these abstract properties generally determine a phenomenon's perceptual accessibility by humans, they also determine the accessibility of many further properties that can be perceived in the phenomena under study (e.g., colour) or that can be inferred from them (e.g., causal mechanisms) and that more commonly are the focus of research. These three metatheoretical properties therefore also determine the methods required for explorations (for details on the paradigm's methodological frameworks, see Uher, 2015a,b,c,e, 2016; Uher et al., 2013a,b).

Various kinds of phenomena

The three metatheoretical properties and the particular constellation of their forms that can be conceived for each given phenomenon are used in the TPS-Paradigm to metatheoretically define and differentiate various *kinds of phenomena* studied in individuals. For example, *morphology*⁴ denotes living organisms' bodily structures and their constituting parts. Morphological phenomena can be located internal and/or external to the body of the individual studied (e.g., stomach, skin); they are temporally extended and material physical. *Physiology* denotes the phenomena of the physical and chemical functioning of morphological phenomena. Physiological phenomena are located primarily internal to the studied individual's body (e.g., metabolism), but some can also become external (e.g., sweat). Many physiological phenomena are strictly momentary (e.g., heart beats, electric potentials) but some are also more temporally extended (e.g., potassium levels in the blood). Physiological phenomena are physical phenomena but not necessarily material (e.g., heat).

The TPS-Paradigm defines the *psyche* as the entirety of the phenomena of the immediate experiential reality, both conscious and non-conscious, of living organisms. It conceives of psychical⁵ phenomena as being located entirely internal⁶ to individuals' bodies. In contrast to material and immaterial physical phenomena (e.g., morphology, physiology), psychical phenomena are perceptible only by each individual him- or herself and cannot be made perceptible by others no matter what invasive or technical methods are used. Moreover, individuals can access their psychical phenomena only on a momentary basis in their *experiencings*, which are bound to the immediate moment. But, despite this, some psychical phenomena are more temporally extended (e.g., psychical representations) and

develop metatheoretical and methodological concepts other than the ones that are explored in this research, thus precluding direct comparisons (for details, see Uher 2015a,d, 2016).

³ In the TPS-Paradigm, the term "non-physical" is put in quotation marks as it denotes properties that are not simply contrasted against the physical, but are complementary instead (Uher, 2015a).

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

⁵ The TPS-Paradigm uses the term *psychical* rather than *psychological* because "events, processes and structures that are properly called psychical do not become psychological until they have been operated upon in some way by the science of psychology" (Adams & Zener in Lewin, 1935, p. vii). The term denotes not only mental but also emotional, volitional and other psychical phenomena because they are always part of individuals' immediate experiential reality as well (Wundt, 1896).

⁶ The TPS-Paradigm's conception of psychical phenomena as being entirely internal to individuals essentially differs from ideas of internalism/externalism. Specifically, it refrains from making idealistic assumptions of an a-priori knowledge. Instead, it specifies the ways in which psychical phenomena can connect with phenomena in the external surroundings so as to enable individuals to get to know about, adapt to and intentionally interact with their external surroundings (Uher, 2013, 2015a,d, 2016).

are therefore called *memorised psychical resultants*—or *experiences*. Psychical phenomena are conceived as “non-physical” because—unlike immaterial and material physical phenomena—spatial properties cannot be conceived (Kant, 1798) and systematic relations to the material and immaterial physical phenomena that accompany psychical phenomena (e.g., brain morphology and physiology) cannot be found (Fahrenberg, 2013; Uher, 2015d, 2016).

What constellation of metatheoretical properties can be conceived for behaviour? In the following, the TPS-Paradigm is applied to explore the various challenges of defining behaviour, to specify properties and criteria and to elaborate a metatheoretical definition.

Challenges in defining behaviour

Researchers think about behaviour in diverse ways. This diversity can be illustrated by the example of five definitions from different fields and disciplines. These definitions have been chosen because they are based on recent reviews in a given field, build on concepts that are more complex than the frequent simplistic definition of behaviours as doings, or incorporate ideas that are central to particular fields but not considered in the other definitions. Thus, this selection is not meant to be exhaustive or representative for all fields of behavioural research considered, but is made to illustrate the diversity of perspectives taken and considerations made with regard to behaviour. In the following sections, the five definitions are first introduced and then explored in terms of their underlying basic assumptions.

Definitions of behaviour from various disciplines: Five examples

1) For biological (animal) behaviour research and on the basis of a large survey among behavioural biologists, Levitis et al. (2009) suggested defining behaviour as:

“the internally coordinated responses (actions or inactions) of whole living organisms (individuals or groups) to internal and/or external stimuli, excluding responses more easily understood as developmental changes” (p. 108).

The authors explicitly excluded internal cognitive and physiological mechanisms, knowing that behaviours necessarily rely upon internal information processing and that this distinction may not always be easy to make. They also excluded developmental processes because these “are generally much slower” than those considered as behaviour (p. 108).

2) A philosopher and historian of biology from the French-speaking world, Pichot (1999), suggested defining behaviour as:

“the organised entirety of the relationships of the living being and its environment (in the wider sense considering all relationships of whatever nature they may be; in the narrower sense considering only sensory-motor relationships)⁷” (p. 117).

Pichot explicated that any single relationship between a living being and its environment, if considered in isolation, should always be explicable by physicochemical laws. But if the entirety of all relationships of an individual is considered globally, living organisms, especially more highly developed ones, are not directly related to their environment according to these laws. This incongruity underlies behaviour. Behaviour channels the physicochemical interplays in the evolution of the *global* relationships between the living organism and its environment. Therefore, the more highly developed living

⁷ French original: “L’ensemble organisé des rapports de l’être vivant et de son environnement (au sens large, on prendra en compte tous ces rapports, de quelque nature qu’ils soient; dans un sens plus restreint, on ne considérera que les rapports sensori-moteurs)” (Pichot, 1999, p. 117).

organisms are, the more complex their behaviours. Pichot pointed out that the living being is connected to only those external conditions of its geographical environment to which it is susceptible, to which it can adapt and/or that it can modify; this he called the external milieu. Thus, the possibilities for action and reaction are limited by the structure that the living being has at a given moment, and the external milieu has a structure that is a function of the structure of the living being.

Pichot emphasised that this broad definition of behaviour does not distinguish between relationships of sensibility, motility, absorption, excretion, etc. and therefore applies to all living beings (e.g., plants, animals). Animal behaviour, thus sensory-motor behaviour, is particularly interesting because animals have a stronger tendency to modify their environment than to adapt their structure to that of the environment. The structure of an animal's external milieu is thus more specifically a function of the structure of the actions that the animal is able to exert rather than a function of the animal's structure itself.

3) A psychologist in the German-speaking world specialising in behavioural observation, Faßnacht (2000), defined behaviour as:

“those ongoing events of an organism or emanating from an organism that can be externally perceived⁸”.

Faßnacht stressed that behaviour is a processual phenomenon (*Geschehen*⁹) that differs from abilities or dispositions, which only enable behaviour. The term organism indicates that behaviour is a universal phenomenon of living beings, whereas experiencing, thinking and feeling are consciousness-carrying (*bewußtseinstragende*) phenomena that not all kinds of organisms are assumed to have in the same way. External perceptibility excludes all those phenomena that are directly accessible only introspectively. Faßnacht emphasised that behaviour is not only an object of research but also subject to the effects of human perception and may therefore also be interpreted and cognitively structured, meaning that it can also comprise inferred elements.

4) A clinical psychologist and psychotherapist, Bergner (2011), considered behaviour is “an attempt of the individual to bring about some state of affairs”, such as by changing existing states (p. 148). He asserted that behaviour is not accessible to traditional means of establishing psychological concepts, such as classical definition or prototype analysis, but only to parametric analysis as used in physics and mathematics. Therefore, he suggested a structuralist formulation describing behaviour as a complex system of eight parameters:

Behaviour = *Identity of the person*, *Want* (motivational parameter), *Know* (cognitive parameter), *Know-How* (skill or competency parameter), *Performance* (procedural aspects such as bodily postures, movements), *Achievement* (outcome parameter), *Personal Characteristics* (individual difference parameter), *Significance* (“what the person is doing by doing the concrete thing he or she is doing”; p. 148).

Bergner considered mental acts (e.g., calculations) as behaviours but not involuntary bodily movements (e.g., patellar reflex) because these “would not be considered amenable to, or intelligible in terms of, analysis via these behavioral parameters” (p. 148). He states that this definition also applies to animals, with the only difference being their different capacity for language, which does not enable animals “to act on the enormous range of discriminations captured in human language and that are thereby available to human beings in their behaviour” (p. 150).

⁸ German original: “Verhalten ist jenes Geschehen, das, an einem Organismus oder von einem Organismus ausgehend, außenseitig wahrnehmbar ist“ (Faßnacht, 2000).

⁹ Geschehen could also be translated as happening or process.

5) A “personality” psychologist, Furr (2009a), explicitly considered the peculiarities of assessment psychology and suggested defining behaviour as:

“verbal utterances (excluding verbal reports in psychological assessment contexts) or movements that are potentially available to careful observers using normal sensory processes” (p. 372).

By including perceptibility by others “through normal senses” in this definition, Furr emphasised the “potentiality for behaviour to have direct social consequences” (p. 372). This criterion excludes many physiological responses, both internal (e.g., neural events and blood pressure) and external (e.g., blushing or sweating), and “most indices of reaction time or computerized cognitive assessment, as such information is not potentially observable through normal sensory processes” (ibid). But this criterion includes “potentially non-intentional responses” such as trembling and gaze aversion, thus, physical movements with “potentially important social implications” (ibid).

Furr stated that assessments are “generally interpreted as indicators of cognitive or affective responses, rather than being interpreted as meaningful ‘behaviours’ in their own right” (p. 372). But his definition also includes many other forms of behaviour, such as verbal and nonverbal, intentional and unintentional behaviours. Accordingly, verbal utterances are behaviours. Furr stressed that “unsolicited, spontaneous verbal statements about one’s (or another’s) personality” should be differentiated from “verbal statements made in response to direct questioning by researchers in a personality assessment context”. By this definition, “verbal statements about one’s personality can indeed be considered behaviours” (ibid).

These five definitions illustrate the diversity of issues that are considered in different fields and the different positions taken on them. The TPS-Paradigm is now applied to explore these definitions for their most basic assumptions. At first, the analyses focus on two major challenges—1) anthropocentric biases and 2) the conceptual differentiation from physiology and the psyche.

Anthropocentric biases

In its philosophical foundations, the TPS-Paradigm explicitly considers that all scientists are human beings with human-specific abilities, perspectives and interests that determine—and limit—their possibilities for exploring the world. This species-specific perspective entails various presumptions that are intrinsic to all human individuals and that may therefore entail two types of systematic errors. *Anthropocentric biases type I* occur when humans focus on only those phenomena that their species-specific abilities enable them to perceive or to conceive of, that are human-like (anthropomorphic) or that humans perceive as such—in the sense of false positive biases. *Anthropocentric biases type II*, by contrast, occur when humans ignore those phenomena that they cannot readily perceive or conceive of, that are not human-like or that humans do not perceive as such—in the sense of false negative biases. These two types of biases can influence research on both the metatheoretical and the methodological level, and they occur in all disciplines (Uher, 2015a).

Anthropocentric biases also influence definitions of behaviour. Specifically, the idea that behaviours potentially “have direct social consequences” (Definition 5) reflects a perspective typical of our highly social human species. Many behaviours need not have direct social implications—otherwise, solitarily living species would not exhibit behaviour for most of their lifetime. Moreover, in laboratory and experimental settings, behaviours are often studied in non-social contexts—but still are considered behaviours.

Accessibility by human perception is a major limiting factor for explorations (Definition 3) but cannot serve as defining criterion for behavioural phenomena (cf. Definition 5). Otherwise, the definition would exclude all those animal and plant behaviours that humans cannot perceive under everyday life conditions and that therefore require technological

methods of investigation (e.g., microscopes, ultrasonic and infrared devices). Behaviour is a universal phenomenon of all living organisms, including all species that already existed long before the first human observers emerged in phylogenetic history. A definition of behaviour should therefore be applicable to all living organisms (Definitions 1 to 4).

Behavioural, physiological and psychical phenomena: Vital but often neglected differentiations

Several of the definitions above incorporate the idea of wholeness in terms of responses organised on the level of the organism and specify physiology and the psyche as important kinds of phenomena that may underlie, internally coordinate and/or mediate behaviours. Some of these definitions exclude physiological and psychical phenomena from the phenomena considered as behaviours (Definitions 1, 2, 3, partially also Definition 5), whereas others include psychical phenomena but still differentiate between bodily, cognitive, motivational and other parameters of behaviour (Definition 4).

The idea of internal coordination entails assumptions of underlying causes (Definitions 1, 2 and 3). Definition 4 even explicitly includes causal explanations. But the *definiens*—that what gives an account of the meaning of the *definiendum*—of that what is to be defined (e.g., the term behaviour)—cannot also contain its explanation. Such definitions are inherently circular and have no explanatory value (Sprung & Sprung, 1987). In research on psychical phenomena, likely because scientists cannot perceive or make them perceptible in the individuals under study, theorising is particularly prone to the erroneous blending of the *explananda*—the phenomena to be explained—with their *explanantia*—the phenomena explaining them (Uher, 2015c). Specifically, if bodily, cognitive, motivational and other parameters already constitute behaviour, what then could explain the complex phenomenon thus-described? Moreover, individuals' internal coordination, internal stimuli and intentions cannot be directly observed; they can only be inferred from observable phenomena. Thus, whether or not a given phenomenon meets particular explanatory assumptions depends on observers' interpretations of and inferences from its perceptible properties (see Definition 3).

The idea of internal coordination entails that conceptual distinctions between behavioural and psychical phenomena are often made only vaguely or not at all. This has yielded some peculiar terms, such as “real behaviour” or “actual behaviour” (Baumeister et al., 2007; Furr, 2009a,b), that suggest there could also be behaviours that are “unreal”, “fictitious” or “imagined”. Are fictions and imaginations thus behaviours? Conversely, psychical phenomena are sometimes called “covert” or “inner behaviours”, referring to their inaccessibility by observers and as opposed to “overt” or “outer behaviours” that are publicly accessible (Bergner, 2011; Koffka, 1935; Skinner, 1957).

But why can behaviours often be observed directly—thus, without any mechanism standing between the observer and the observed (Faßnacht, 1982), whereas it commonly requires physical instruments (e.g., stethoscopes) and invasive techniques (e.g., electrodes) to capture physiological events? And why are even the most sophisticated technologies unable to capture any single event of experiencing (Uher, 2016)? Ultimately, why do researchers use the terms behavioural, psychical and physiological at all if not for highlighting essential differences between the phenomena thus-denoted?

The elementary system of the three abstract properties that determine a phenomenon's perceptibility by humans and that are at the core of the TPS-Paradigm's metatheoretical framework provide a scheme that allows for conceptually differentiating behavioural, physiological, psychical and other kinds of phenomena from one another. Importantly, these differentiations are made only on the metatheoretical level. The TPS-Paradigm also explicitly considers that, in living organisms, phenomena of various kinds (e.g., physiological, behavioural and psychical), each with their various kinds of events (e.g., different physiological events), co-occur in coordinated ways. They match and interact with one another, creating functional interrelations that are largely based not just on linear causal connections but in particular on *compositional connections* (Gefüge-Zusammenhängen;

Rothschuh, 1963). The entirety of the joint interactions of various kinds of phenomena and events results in complexes and functions of higher organisation such that the presence or absence of single phenomena, single events or single interrelations can fundamentally change their overall interactions (known as the *principle of emergence*¹⁰). For example, in patients suffering from locked-in syndrome, the pathological loss of voluntary motor-control results in an inability to produce behaviour. This loss of behavioural abilities creates a condition that is hard to differentiate from a vegetative state, although the psychological abilities of many of these individuals are fully intact (Laureys et al., 2005).

The metatheoretical differentiation between psychological, physiological and behavioural phenomena is essential because compositional connections can be identified only if the particular kinds of phenomena or events that are involved in a particular ability or process are clearly differentiated from one another—at least metatheoretically. For example, the various enzymes and pH-values that are involved in the metabolic processes in the mouth, stomach and intestines must be identified in order to explore their fine-tuned co-occurrences in spatial and temporal proximity and to identify the complex interactive processes that take place between them (Dewey, 1896; Rothschuh, 1963; Uher, 2015c).

Considering this, the five definitions above leave an essential question largely unanswered: What particular perceptible properties should a phenomenon have in comparison to other kinds of phenomena, such as physiology and the psyche, in order to be identified as a behaviour?

What is behaviour? A metatheoretical definition

The three spatio-temporal properties considered in the TPS-Paradigm are now used to elaborate criteria that allow for differentiating behavioural from physiological and psychological phenomena and to elaborate a metatheoretical definition of behaviour. To guard against the operation of anthropocentric type II biases, the definition must be applicable across species. Cross-species perspectives also help to illuminate the ways in which humans are, in fact, unique (Uher, 2008a,b, 2015d)—and to explore whether or not language is behaviour.

Therefore, let us consider three nonhuman examples. Fertile male gorillas, the silverbacks, can produce, when excited or stressed, musty, often pungent body odours called fear scents. Breeding birds not only sit on their eggs but also emit extra warmth toward their clutch. Octopuses, similar to chameleons, hide from predators by adapting their skin colour and surface texture to their immediate external surroundings. Are such phenomena of camouflage and emission of warmth and odours behaviours?

Defining criteria of behavioural phenomena

The behavioural phenomena of interest to social scientists, psychologists, animal and plant scientists must be distinguished from the phenomena studied as the behaviour of fire, water, air, soil and artificial intelligence. Hence, the definition refers to the behaviour of *living organisms* (Definitions 1-3; for a definition of living versus nonliving, see Schrödinger, 1944).

For living organisms, the philosopher Millikan (1993) suggested a profound and illuminating definition of behaviour. First, she clarified that behaviours are not just movements and that, conversely, not all movements are behaviours (Definitions 1, 2, but see Definitions 4, 5). Birds typically do not move to incubate their eggs. Silverbacks need not move to emit fear-scents. Neither do octopuses need to move to camouflage; rather, they often rest motionless when camouflaging against predators, their lack of motion being part of the camouflage.

¹⁰ Given that complex organismal systems function as organised *wholes*, the so-called *principle of emergence* denotes that their properties cannot be deduced from knowledge of the constituting elements and their interrelations. When such systems are assembled from their elements, new properties and functions of the whole emerge, and these could not have been predicted from knowledge of their constituents and the interrelations between them. The whole has different properties, structures and functions (e.g., Rothschuh, 1963; Uher, 2015a,d).

Millikan (1993) suggested that behaviour is an *external change or activity* exhibited by an organism (Definition 3). Externality roughly distinguishes behaviour from physiological processes, such as neurotransmitter activity (Definition 1). Externality also allows things other than movements to be behaviour (Definition 2), such as the emission of acoustic, visual, olfactory, electric or radiative signals—as in our three nonhuman examples. Hence, not all behaviours are visually or acoustically perceptible (cf. Definition 5); there are no surface features that distinguish behaviours from other activities (Millikan, 1993).

But Millikan (1993) emphasised that not all of an organism's externalisations are behaviours, because they can also be mere by-products of its chemistry and physics. Indeed, externalisations can also fulfil functions with regard to the organism's physiological regulations, such as loss of heat or sweating serving the organism's thermoregulation or metabolism (Definitions 1, 2 and 5). Birds emit heat to thermo-regulate, which in itself is not behaviour. But for incubating eggs, birds emit extra heat targeted toward their clutch. Millikan emphasized that functional externalisations are behaviour only if their *functions have reference to the environment* or to the organism's relations to it. Hence, behavioural phenomena cannot be isolated and described without reference to the environment in which they occur; behaviours can never be decontextualised (Definition 2; Uher, 2008b, 2015e).

Therefore, Millikan (1993, p. 163) defined behaviour as the *environmentally mediated functional form of the external change or activity of an individual organism*. Similarly, Ribes (1986, p. 118) stated that behaviour "... is in essence, an interactive process. As such, it consists of a complex system of interdependent relations between the individual organism and the objects, events, and other organisms in the environment" (see Definition 2). All of our three nonhuman examples fulfil Millikan's criteria. The silverbacks' fear-scent emissions are functional externalisations with reference to their conspecifics; they serve as a means of olfactory communication in the dense vegetation. The birds' emission of heat for incubating their eggs is an external activity that is functional by enabling the extra-corporeal embryonic development of their offspring. The octopuses' changes of skin colour are functional for camouflage against predators only with reference to their immediate surroundings.

The TPS-Paradigm builds on and extends Millikan's definition (Uher, 2013, Uher et al., 2013a) by specifying the particular forms that it conceives for behaviours with regard to the three metatheoretical properties. Following Millikan (1993), it conceives of behaviours as phenomena that occur entirely external to individuals' bodies. Externality enables perceptual accessibility by conspecifics, consciously or not (Definition 3). Behaviours are physical phenomena that are mostly immaterial (e.g., movements, changes) and only sometimes material (e.g., odour molecules, spit) and that are always bound to individuals' bodies (e.g., limbs, vocal chords, glands) and to phenomena external to them (e.g., ground surface, air). Unlike Millikan (1993), the TPS-Paradigm conceives of behavioural phenomena as momentary. It emphasises that behavioural events often have only brief yet variable temporal extensions (e.g., vocalisations). Behaviours are actualities, ongoing events with processual properties (Definitions 1 and 3; Uher, 2015a,e).

Hence, in contrast to other research paradigms and in line with Millikan (1993), the TPS-Paradigm conceives of neither physiological responses nor mental activities as behaviours. Rather, it considers that, with regard to the three metatheoretical properties, different constellations of forms can be conceived for behavioural, physiological and psychological phenomena, which therefore represent phenomena of different kinds and require different methods of exploration (see above; Uher, 2015a).

To metatheoretically define behaviour, and exceeding Millikan's definition of behaviour, the TPS-Paradigm further elaborates on the concept of "environment".

"Environment": The contextual phenomena of situations and behavioural situations

"Environment" commonly denotes external phenomena that surround the individual under consideration and that are conceived of as being separated from it. The TPS-Paradigm refrains from using such dualistic concepts. Instead, it considers that individuals interact with only those particular properties of their external surroundings that are relevant

for them and that they can perceive given their particular organismal properties. Therefore, the same surroundings are not the same for all individuals; what constitutes the “environment” for any given individual depends on that individual (Definition 2; Lewin, 1936; Nagel, 1974; Rotter, 1954; von Uexküll, 1909). “Environments” (e.g., culture, language) do not exist independently from the individual (Uher, 2015a; Valsiner, 1987).

Material artefacts and human vocalisations, for example, first become cultural and language phenomena through the meanings that individuals attribute to them in socially shared ways. These meanings are not inherent to the external physical phenomena that are used as signs (e.g., carvings in stone, ink on paper) but are only *assigned* to them by particular communities of individuals. It is individuals’ ideas—thus, *psychical* phenomena, which are internal and inseparable from individuals—that first turn these external physical phenomena (e.g., stone carvings, ink patterns and sound waves) into signs (e.g., written and spoken language; see lower part of Figure 1). Dualistic concepts in which signs are explored as if they were exclusively separated from the individuals who develop and use these signs (e.g., for exploring the influence of culture on individuals’ behaviour) therefore entail circular explanations.

To reduce conceptual misunderstandings, the TPS-Paradigm uses the term “context” rather than “environment”. To circumvent the problems of dualistic concepts, it introduces the concepts of basic kinds and composite kinds of phenomena. *Basic kinds of phenomena* are called basic because they are inseparable¹¹ from the intact bodily entity of the individual under study; this applies to the phenomena of morphology, physiology, behaviour and the psyche. *Composite kinds of phenomena*, by contrast, each comprise several different kinds of phenomena, among them at least one basic kind of phenomenon. Composite kinds of phenomena are therefore more heterogeneous and complex than each of the basic kinds of phenomena in and of itself (Uher, 2015a).

Contexts are conceived as composite kinds of phenomena. Among the phenomena comprised therein—and commonly in the focus of contextual explorations—is at least one basic kind of phenomenon, which is inseparable from the intact individual under study (e.g., behaviour). In addition, contextual phenomena may comprise external phenomena that are physically independent from the body of the individual under study (e.g., books, monuments, other individuals). The different kinds of phenomena comprised by a composite phenomenon can be conceptually separated from one another on the basis of the three metatheoretical properties considered in the TPS-Paradigm. But importantly, this separation is conceived as an *inclusive separation*—what constitutes the context of an individual is determined by properties that are inseparable from that individual.

In the TPS-Paradigm, distinctions are made between various kinds of contextual phenomena. A *situation* denotes the *particular constellation of events of all kinds of internal and external phenomena that are present in a given moment*. This concept is much broader than most other situational concepts used when studying individuals. Specifically, an individual’s situation always comprises *internal physical* events of morphology and physiology (e.g., nutritional state, hormonal levels) because they are always present at any given moment. It also comprises all *psychical* events that are present in the given moment; thus, all experiencings including all memorised psychical resultants that are currently activated (e.g., self-perceptions, emotions, retrieved knowledge). From the universe of all *external physical* events, a situation comprises those events that are present in a given moment and that are, given the individuals’ organismal properties, directly perceptible by the individual (consciously or not).

¹¹ Inseparability here refers to the material entity of the healthy and physically intact individual. Invasive methods can be used to separate parts of an individual (e.g., inner organs, blood) from his or her body; but once removed, these parts no longer belong to the individual’s material entity.

Behavioural situations are situations of a special kind that denote the particular constellation of those *external physical events* that functionally mediate¹² the individual's external changes or activities in a given moment—thus, his or her behaviours. Hence, the events that constitute a behavioural situation for an individual are external to its body. But the criterion for demarcating these events from the universe of all external events that are present in a given moment is bound to properties of the individual considered—they are separated inclusively from it. The criterion for this demarcation is the external events' effectiveness in making functional the individual's external activities and changes that thereby become behaviours. Importantly, this demarcation is based on individuals' *external* bodily events that can be perceived by others (i.e., behavioural events) rather than on internal ones that others cannot perceive (e.g., psychical events).

The concept of behavioural situations builds coherently on the metatheoretical differentiations that the TPS-Paradigm makes between behavioural, psychical and other kinds of phenomena and on the recognition that, in individuals, these different kinds of phenomena are tightly interrelated in complex compositional connections. Given this, the TPS-Paradigm considers that behavioural situations are also *psychically relevant* for the individual because they functionally mediate the individual's behaviour, and thus its relations to its immediate external surrounding (see Definition 2). The metatheoretical differentiations between behaviour and psyche also allow for conceiving that some situations are solely psychically relevant in that the individual interacts only *internally* with external physical events (e.g., during visual perception), without interacting with them behaviourally as well (for details, see Uher, 2015d). Reading, for example, is a mental activity that involves hardly any behaviour at all (e.g., eye movements). The famous physicist Stephen Hawking, who suffers from a motor neuron disease, has a pronounced inability to behave (e.g., to speak, move) but this does not impair his ability to read (Hawking, 2013). Locked-in patients can read, although their lack of behaviour may cause them to appear to be in a vegetative state (Bauby, 2007). But nonhuman individuals looking at a text cannot be assumed to be reading even though they may move their eyes across the material in front of them just as humans do while reading.

The metatheoretical differentiation of behavioural situations from other kinds of situations allows for better scrutiny of the ways in which individuals connect with external events (e.g., how the entirely internal phenomena of the psyche can connect with events external to the individual; Uher, 2013, 2015d, 2016). This allows for exploring the relevance and function that particular constellations of external events—as perceived and conceived by particular human observers (e.g., researchers)—have for particular individuals. Importantly, the particular external properties that are, in fact, functionally mediating particular behaviours in particular individuals need not become directly apparent, be known a priori or be even consciously perceptible by humans (e.g., subliminal odours). Their exploration may therefore be prone to all kinds of ego-, ethno- and anthropocentric biases. Identifying the particular external events that are functionally mediating particular behaviours in particular individuals is ultimately a matter of research (Hinde, 1974; Uher, 2015a,d,e, 2016).

In this conception, the notion of functions is crucial.

What are functions?

The TPS-Paradigm conceives of *functions* as temporal interrelations that regularly occur between particular kinds of phenomena, events or properties—thus, as established effects (derived from the Latin *effectus* for “worked out, brought about, accomplished”). The temporal dimensions thereby considered may range from rather momentary to long-term (e.g., evolutionary) perspectives. These interrelations may be (e.g., linear) causal connections; however, in living organisms, they tend to be compositional connections and

¹² In the TPS-Paradigm, the meaning of the term *mediation* refers to the Latin *mediare*, meaning to be in the middle.

thus highly complex, not identically repeatable and therefore often not predictable (Rothschuh, 1963; Uher, 2015a,c).

Importantly, functions thus defined imply neither purpose nor intention because teleological properties presuppose that possible prospective outcomes are simulated and evaluated on the basis of retrospective analyses of experiences made in the past. This is possible only for psychical phenomena (Uher, 2015d). Mental abilities enable individuals to plan ahead, develop intentions and make deliberate choices about their future behaviours (Tomasello, 2014)—future behaviours thereby become *actions* (Bandura, 2006). The term action thus refers to functional activities that emerge from the compositional connections between behavioural, psychical and other kinds of phenomena over some time. The three metatheoretical properties considered in the TPS-Paradigm allow for conceptually differentiating between the various kinds of phenomena that are involved in individuals' actions. This is essential for unravelling the specifics of their compositional connections and the more complex functional processes that emerge from them.

The functions of living organisms' external activities that are externally mediated in the present—thus, the functions of their behaviours—may not become readily apparent for humans under everyday conditions (e.g., functions occurring on the atomic, molecular or chemical levels). From momentary functions and their interactions over time, numerous and more complex functions of different quality and quantity can emerge in the nearer or more distant future (see the principle of emergence¹⁰). The birds' emission of heat while incubating their eggs creates surroundings for their offspring that enable single cells to develop into complex multi-cellular organisms. For human observers, the results of the immediate externally mediated function of the birds' breeding behaviour can be perceived only weeks later when the developing chicks emit the first sounds from within their eggshells and when they finally hatch. The immediate function of breeding becomes more directly apparent in the fact that, without incubation, the embryos die quickly within their shells.

From immediate functions and their interactions over time, more complex functions may emerge that also continue far into the future. Incubation serves the birds' reproduction and hence the survival of their species, which could ultimately also have functions for speciation. But because behaviours are only momentary, they could not have any functions in the future—and thus also not for future evolution—if they do not also have functions of whatever kind and at whatever micro or macro level in the *present surroundings*.

Behaviour can be studied on all of these different levels of consideration ranging from molecular functions in the present over ontogenetic and adaptive functions to evolutionary functions over billions of years (Tinbergen, 1963). It is a matter of scientific interest to decide which particular functional levels and time frames to consider. Importantly, functional relations—and thus, *causality*—can be explored only in the backward direction, *in retrospect*, such as by analysing experimental outcomes or by using abduction¹³.

A metatheoretical definition of behaviour

Summarising the concepts and notions elaborated above, *behaviour* can be defined as the

“external changes or activities of living organisms that are functionally mediated by other external phenomena in the present moment”.

This metatheoretical definition specifies that behaviours are phenomena that occur entirely external to the intact body of the individual considered (Definition 3). *Externality*

¹³ Abduction is a special form of logical inference that seeks explanations in retrospect—from facts found in the present, hypotheses and concepts are generated, the consequences of which, if they were true, would resemble the facts found. Hence, there is reason to assume that these generated hypotheses provide valid “explanations”, but their truth remains *uncertain* because with abduction, the possible causes inferred necessarily lie in the past (Peirce, CP 5.188-5.189).

differentiates behaviours from all psychical phenomena, all phenomena of inner morphology and most physiological phenomena (Definitions 1 and 3). *Momentariness*¹⁴ differentiates behaviours from developmental processes (Definition 1) and from individuals' inner and outer bodily morphology. Defining behaviours as external changes or activities specifies behaviours as physical phenomena that are mostly immaterial but that can also be material (e.g., defensive secretion in ants and skunks).

The definition highlights that behaviours always have a functional *reference to* other external phenomena or to individuals' relations with other external phenomena (see behavioural situations; Definition 2). The external phenomena that fulfil mediating functions for behaviours may belong to the individual's own body (e.g., hair, skin) or be physically independent of it (e.g., other conspecifics, air).

The TPS-Paradigm broadly refers to all phenomena covered by this definition as behaviours (comportement, Verhalten) and refrains from using more specific terms like *utterance* (propos, Äußerung) or *conduct* (conduite, Benehmen/ Betragen) that commonly refer to behaviours of a particular kind (e.g., verbal) or to their social valences. The terms *reaction* and *response* are not used synonymously with behaviour because they imply assumptions regarding the sequential occurrence of particular phenomena or events (e.g., stimulus-response; Definition 1), which may apply only to causal but not to compositional connections. Likewise, the term *action* is not used synonymously with behaviour because action implies assumptions about underlying intentions and agency (as in concepts of elicited versus spontaneous behaviours; Definition 5). Causal assumptions cannot be the subject matter of a definition of behaviour without introducing circularity to the explanation. The term *activity*, by contrast, is used very broadly in the TPS-Paradigm and without agentic connotation given its widespread use in research on nonliving phenomena as well, such as in physics and chemistry (e.g., radioactivity).

Now, considering this metatheoretical definition of behaviour, what implications can be derived with regard to self-reports? Is human language a behaviour?

Human language – A special kind of behaviour or more than that?

Behaviour is an essential means for individuals to externalise information from their (entirely internal⁶) psychical systems to their external surroundings. The momentariness of behaviours enables flexible and real-time externalisations, which is essential for individuals' ability to interact with and to adapt to dynamic and changing external surroundings (e.g., social interactions, ecological changes). Such enormous flexibility and plasticity are enabled neither by the temporally more extended phenomena of morphology nor the phenomena of physiology, which, although often momentary, are (genetically) rather fixed and unchanging over an individual's lifetime (Uher, 2013, 2015a,d, 2016).

Language as semiotic representations conceived as composite kinds of phenomena

To convey information of vital importance in rather constant (likely evolutionarily derived) and thus limited ways, species-specific behaviours have evolved (Hinde, 1974). Individuals can also convey information in *arbitrary* and thus varying ways via external changes or activities other than species-specific behaviours (e.g., vocalisations, movements). The assignment of meanings makes these externalisations functional—thus turning them into (*semiotic*) *behaviours*. When such *assignments* are made by multiple individuals in socially shared ways, the particular behaviours become *behavioural signs* (e.g., gestures, spoken language). Meanings can also be assigned to material phenomena that are independent of individuals' bodies (e.g., charcoal on stone), which thereby become *material signs* (e.g., drawings, written language). Human communities have developed comprehensive systems

¹⁴ In the TPS-Paradigm, momentariness is conceived in terms of the dimensions of human experiencings in everyday life conditions, not in terms of the shortest perceptible moments determined in some neuroscientific fields of research (Uher, 2015a).

of behavioural and material signs (e.g., spoken, hand-sign and written language) that enable humans to overcome the fundamental imperceptibility of psychical phenomena by others and to communicate complex information that goes beyond that which can be externalised in species-specific behaviours (Uher, 2015d, 2016).

Signs (e.g., icons, indices, symbols) are created to encode meanings in external physical events that other individuals can directly perceive and that they can use to decode the meaning again, such as the vocalisations [tri:] or [aRbR] or chalk applied on boards such that it forms visible patterns like “TREE” or “arbre” (Figure 1). In the TPS-Paradigm, this encoding in physical events is called *external physicalisation*. It facilitates and enables the social co-construction of meanings because external physical events are perceptible by many individuals, thus enabling joint perceptions. But meanings in and of themselves are psychical phenomena and are therefore always bound to the individuals who *assign* them to particular external events. This entails that the meanings individuals construct for signs (especially more abstract meanings) may vary, thus representing *fields of meanings* (Rosenbaum & Valsiner, 2011; Uher & Visalberghi, in press). Therefore, the particular meanings that particular individuals may decode from particular signs need not be identical to the meanings that others may have intended to encode in these signs. This has important consequences for research methodology (Uher, 2015b,c,d).

Considering this and similar to the conception of contextual phenomena, the TPS-Paradigm refers to signs as *semiotic representations* and conceives of them as *composite kinds of phenomena* comprising external physical phenomena (e.g., vocalisations like [tri:], ink printed on paper forming TREE) that are tightly intertwined with psychical phenomena (e.g., mental representations of trees) and that therefore cannot be understood as signs without considering these psychical phenomena. Hence, semiotic representations are always composed of both psychical (thus internal) phenomena and external physical phenomena (Figure 1).

This metatheoretical concept also highlights the fact that semiotic representations always involve behaviours—either as part of behavioural signs (e.g., in gestures and spoken words), or for producing and using material signs (e.g., in writing and drawing; see lower part of Figure 1).

The two levels of meaning conveyed in human language

Behavioural signs enable individuals to uncouple the transmission of meaning from the spatial and temporal coincidence of the particular events to which the meanings and signs refer—thus, from their *referents* (Figure 1). But because behaviours are momentary, the transmission of meaning is still bound to the particular moments in which the behavioural signs are displayed and to the particular individuals who display them. By contrast, material signs are temporally more extended and can also be independent of individuals’ bodies. This enables individuals to uncouple the processes of *encoding* meanings in signs from the processes of *decoding* the meanings from the signs again. Thus, in material signs, meanings can be transmitted not only in the absence of their referents but also across time and space (Uher, 2015d).

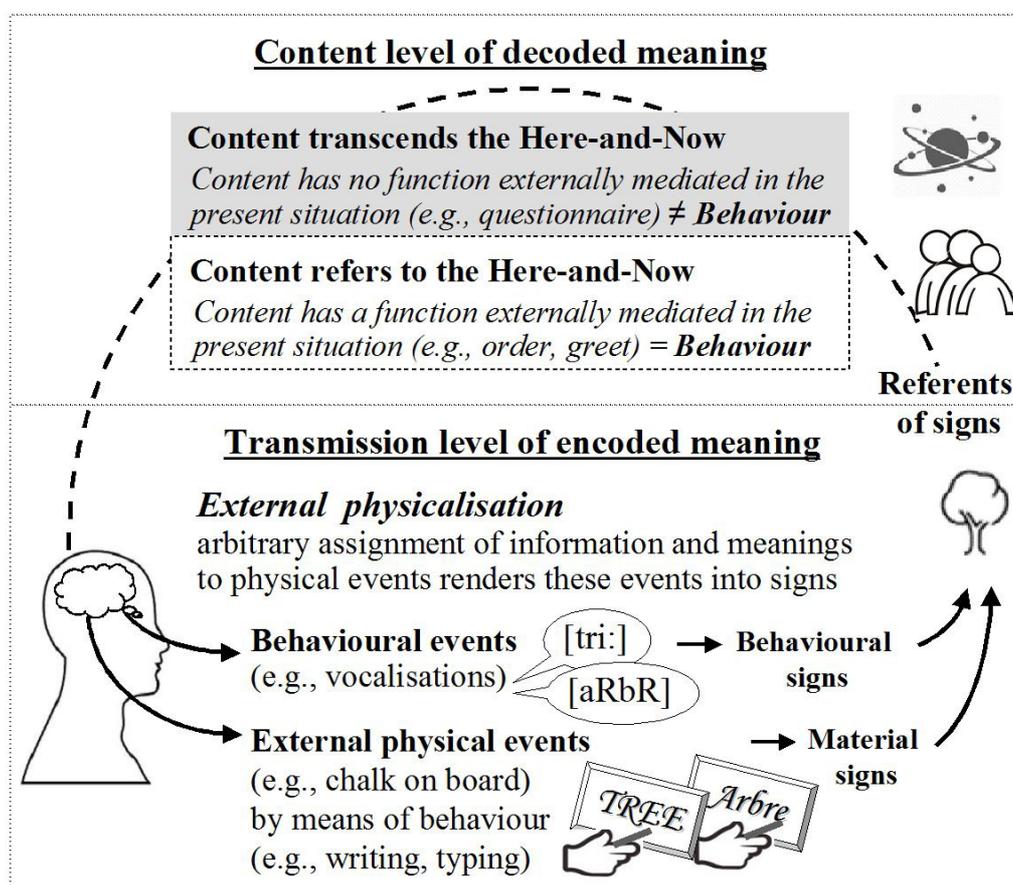
These unique abilities turn the behaviours that are involved in the production and use of language into behaviours of a very special kind. These special kinds of behaviour have opened up novel and unprecedented channels for communication that meaningfully extend humans’ behavioural possibilities and that can go far beyond anything enabled by non-language behaviours—such as the transmission of knowledge across time and space.

To further explore the ways in which language behaviour enables these special communicative functions, the TPS-Paradigm metatheoretically differentiates two levels of meaning conveyed in human language. First, the behavioural and material signs that are used to encode and transmit meanings are conceived as the *transmission level of encoded meanings*. Second, the content conveyed by these signs and the meanings that they represent—that is, the idea of their referents—are conceived as the *content level of decoded*

meanings. Hence, the content level is a second-order level of meaning that arises from the first-order level of meaning transmitted via behavioural and material signs (Figure 1).

But despite this, the content level of language is largely independent of the transmission level in that very different behaviours can be used for transmitting the same content. For example, humans can convey the same information content like “the children play ball” using very different behavioural signs, such as the phonemes and morphemes of the spoken and hand-sign languages of English, Russian or Japanese. The same information can also be encoded in the material signs of these languages by using different kinds of symbols, such as Latin, Cyrillic or Kanji letters. These material signs can be produced through very different behaviours, such as carving into stone with a hammer and chisel, handwriting with a pen, typing with ten fingers on a computer keyboard or with a stylus on a handheld screen. People may also convey the same information content by ticking the respective categories on questionnaires, if such are provided. Hence, on the content level of language, people can convey the same information by means of very different kinds of behaviour on the transmission level of language (Figure 1).

Figure 1 The two levels of meaning conveyed in human language



Behavioural signs, as conceived in the TPS-Paradigm, comprise not only the symbolic systems of spoken and hand-sign languages but also *semiotic non-language behaviours*, such as gestures, postures, facial expressions and intonations. Compared with symbolic systems, meanings are assigned to semiotic non-language behaviours in less standardised ways. This entails that many situational, regional and socio-cultural determinants influence the particular meanings that are meant to be encoded by particular non-language behaviours, thus creating fuzzy and highly context-sensitive fields of meanings that are more heterogeneous than the fields of meanings people construct for the same language term. Species-specific behaviours, by contrast, are universal to all

individuals of a species and convey rather invariant meanings that, moreover, are often determined by rather specific situational determinants (see Hinde, 1974).

The distinction between semiotic behaviours and species-specific behaviours is metatheoretically relevant and can meaningfully contribute to evolutionary theory (Uher, 2015d). But disentangling human behaviours that can be conceived as semiotic from those that cannot is complicated by the fact that all semiotic behaviours necessarily lie within the behavioural possibilities of the human species. Thus, semiotic behaviours are human-specific behaviours that are socio-culturally transformed to a variable degree (Pike, 1954).

Moreover, in everyday life, language behaviours are commonly embedded into various other behaviours. In fact, language and non-language behaviours are often interdependent and can also functionally substitute for one another to some extent. Moreover and importantly, the meanings conveyed on the content level of language can, but need not, be in accordance with the meanings conveyed in accompanying non-language behaviours. Rather, the meaning of non-language behaviours may even contradict the established literal meaning of the lexical symbols used, thus modifying and even changing the emergent whole of the content conveyed. This again reflects the independence of the two levels of meaning that the TPS-Paradigm differentiates metatheoretically. Analysing communication solely in terms of the literal meanings ascribed to lexical symbols—as is commonly the case in questionnaire studies—may therefore introduce biases into the decoding of meaning (Knapp & Hall, 2010; Pike, 1954; Wiener & Mehrabian, 1968).

When is language behaviour? The crucial criterion of functional mediation in the here-and-now

The two levels of meaning conveyed in human language can be functionally mediated through other external phenomena that are present in the given moment and situation, thus fulfilling the metatheoretical definition of behaviour elaborated above.

On the transmission level of encoded meanings, the signs used to encode and transmit meanings are functionally mediated first through the *external physical surroundings*. Air transmits sound waves that cause other individuals' eardrums to vibrate; ink on paper allows for creating visual patterns that others can see. Second, signs are functionally mediated through the *semiotic systems* that are established in a given community and through which particular meanings are assigned in socially shared ways to the particular physical events that are used as signs. This enables different individuals to encode in and decode from the same set of signs meanings that are sufficiently similar, thus enabling their social co-construction.

On the content level of decoded meaning, the information content that is being semiotically conveyed can be conceived of as an externalised activity, the function of which can be externally mediated in the here-and-now. This is the case when the meaning is decoded by other individuals during social interactions, for example, when people verbally greet, order, invite, request, warn or persuade others. Thus, the content—i.e., the *what-is-being-said* in and of itself—can constitute social behaviour (see similarly the concepts of *Sprechakt* and *Sprechhandlung* [speech act and speech action], Bühler, 1934, and speech act theories, Austin, 1962; Searle, 1969). This is a further function of language that opens up novel and unprecedented opportunities for communication and the exchange of ideas and knowledge between individuals—an ability that may even have been the primary function of language in the course of human evolution (Uher, 2015d).

Crucially, the transmission level of language is bound to the immediate present—the *here-and-now*, which is conceived as the period between the *what-is-no-longer* (the past) and the *what-is-not-yet* (the future). Encoding and decoding meanings (e.g., speaking, writing and reading) is inherently momentary because these activities involve behavioural and psychical phenomena. But on the content level of decoded meanings, humans can refer to times from the big bang of the universe till its very end, to things as tiny as nuclear particles or to ideas as abstract as time and space. In language, humans can convey information content about everything that they can perceive or conceive of (i.e., every

phenomenon) and that they can encode sufficiently well in signs of socially shared meaning. This is not possible for any other kind of behaviour.

Non-language behaviours, by contrast, can convey only limited ranges of meaning. As far as we know, none of the natural¹⁵ communication systems of nonhuman species transmit information that transcends the present. Honeybees, for example, have evolved complex dances that enable these insects to inform their conspecifics about the quality, quantity and location of food sources several miles away (von Frisch, 1967). But they convey only information about something in the present (e.g., “there is food that can be collected 10 miles north from here”), not about something in the past or future (e.g., “there has been food 10 miles north that could have been collected yesterday” or “there will be food that can be collected tomorrow”). The body secretions that many nonhuman species use to scent mark their territories allow for making inferences on information that has been encoded in the past (e.g., “a male lion was here recently”). This is possible because marking behaviours involve material signs (e.g., gland secretions) that are more persistent than the behaviours needed for producing them and separate from the marking individual’s body, therefore allowing meanings to be transmitted across time. But when the materials that are used as marks are being created, individuals transmit in these signs information about something in the present (“I am here”; “this is my territory”) not about something in the past or future (“I have been here yesterday”; “I will be here tomorrow”) as is possible with human language.

Hence, the crucial difference between the two levels of meaning of human language is the fixed functional reference of the transmission level to the here-and-now, whereas the content level can refer to any time, any place and any kind of phenomenon humans can conceive of. The metatheoretical concept of the two levels of meaning reflects the fact that the complex systems of today’s human languages allow for conveying information content that is highly abstract and that may also be unrelated to the present moment in time, thus enabling individuals to transcend their current situation and time.

Importantly, these metatheoretical concepts do not imply that clear-cut differentiations can always be made with regard to specific examples. But these concepts are useful for scrutinising what kinds of phenomena are actually explored through the use of particular methods and, in turn, what methods are needed to explore particular kinds of phenomena (Uher, 2015a,b,c,e). This helps to answer the question as to what kinds of phenomena can be captured with language-based methods, such as interviews or questionnaires (Definition 5). Specifically, if the information content conveyed in language is functionally mediated in the present moment and situation, this content in itself can be considered a behaviour (e.g. in the statement “Please go and get some milk”). This is also the case when some elements of the conveyed content refer to the past (“we forgot to buy milk yesterday”) or the future (“we will run out of milk tomorrow at the latest”). The content’s reference to the present situation may also be contained only indirectly in the particular lexical signs used (e.g., by saying “We are running out of milk” followed by “the shops close at 8 p.m.” or [a pause]; for detailed analyses of this kind see Wiener & Mehrabian, 1968).

By contrast, if the information content conveyed in language transcends the communicator’s present situation and if it is, in and of itself, not functionally mediated by other external events that are present in the given moment, this content cannot be conceived as behaviour. A typical example is teaching situations in which information is exchanged that is not functionally relevant in the present situation, such as in the statement “Milk is produced by mammals”. But again, everyday life communications are often mixed and contain both content elements that are functionally relevant in the given situation and content elements that are not relevant (see Pike, 1954).

The novel metatheoretical concepts elaborated in this research also shed new light on the assessment and questionnaire methods that are used in psychology and the social sciences. These concepts can illuminate the question as to whether and to what extent

¹⁵ Great apes who have acquired human-designed systems of semiotic representations are able to comprehend and convey information about the past and future (Savage-Rumbaugh & Lewin, 1996).

these methods enable researchers to capture respondents' behaviours. Specifically, the finger movements that people use to mark statements and answer categories are behaviours that are displayed in the current situation. These behaviours are functionally mediated by the writing materials used (e.g., paper and pen, computer), thus producing material signs (e.g., marks on a scale). This is the transmission level of meaning. But the content asked about in questionnaires is seldom functionally relevant for the respondents in the given situation of enquiry (e.g., sitting alone at a desk or computer). Instead, the meanings conveyed on the content level of language commonly transcend the respondents' current situation (e.g., information about habitual behaviours as collected in "personality" inventories). Therefore, the information content conveyed in questionnaires cannot be conceived of as behaviours (see Definition 5 in which "verbal utterances" but not "verbal reports in psychological assessment contexts" were considered as behaviour). Contrary to widespread assumptions, content-based analyses of questionnaire answers cannot be used to explore behaviours.

Summary and conclusion

The Transdisciplinary Philosophy-of-Science Paradigm (TPS-Paradigm) was applied to explore from a metatheoretical viewpoint various challenges in defining behaviour (e.g., anthropocentric biases, lack of differentiation between behaviour, physiology and psyche) and to scrutinise basic assumptions that are made about behaviour in different disciplines. Building on the TPS-Paradigm's research frameworks and on Millikan's (1993) philosophical definition of behaviour, this article elaborated metatheoretical properties of behaviour (i.e., external to individuals' bodies, momentary and [mostly immaterial] physical) and central concepts (e.g., contexts, situations, functions), from which it derived the metatheoretical definition of behaviour as the "external changes or activities of living organisms that are functionally mediated by other external phenomena in the present moment".

This definition was then applied to explore the phenomena of language, highlighting that, unlike species-specific behaviours, language allows meanings of all kinds to be conveyed, no matter how concrete or abstract. These unique abilities of language were further explored by introducing the metatheoretical concept of the two levels of meaning that are conveyed in human language (i.e., the transmission level of encoded meanings and the content level of decoded meanings). The analyses showed that the transmission level always involves behaviour (as behavioural signs or to produce material signs). They also revealed that, if the transmitted content is functionally mediated in the here-and-now, then the what-is-being-said can constitute behaviour in and of itself. But human language also allows for transmitting content information that transcends individuals' current situation; in this case, the what-is-being-said does not constitute behaviour.

These insights shed new light on the question of what questionnaire responses are actually measuring. They showed that questionnaire responses inherently involve behaviours on the transmission level (e.g., ticking off answer categories). But the information content that researchers are actually investigating in assessment methods does not constitute behaviour because it is not functionally relevant in the given situation of enquiry. Not every linguistic externalisation is behaviour.

The novel concepts presented in this research can also meaningfully complement and open up new perspectives on existing theories about language and behaviour. Specifically, they highlight that language behaviours have unique abilities that meaningfully extend humans' behavioural possibilities and that can also go far beyond anything enabled by non-language behaviours. These insights may contribute a novel piece of theoretical explanation to the crucial role that language has played in human evolution.

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