A new scientific paradigm for research on individuals

It has been long known that a comprehensive understanding of individuals requires the joint expertise of multiple disciplines. But theories and methods from different disciplines cannot be easily combined, and the findings often cannot be directly compared. Therefore, Jana Uher has explored the "theories behind the theories and methods"—the metatheories and methodologies—that researchers from different disciplines have developed about individuals. On this abstract level of consideration—in science, referred to as philosophy-of-science—she specified three properties that determine the ways in which humans can perceive a given phenomenon. As all scientists are humans, these three properties also determine the methods needed to overcome the limitations of human perception for enabling scientific investigations. On the basis of these properties, Jana Uher developed research frameworks that are applicable across the sciences and that are integrated in the Transdisciplinary Philosophy-of-Science Paradigm. This new paradigm therefore provides important tools for bridging gaps between disciplines and for enabling collaborative research.

Individuals are explored in many different sciences, such as biology, medicine, psychology, sociology and economy, that are each specialised on particular phenomena and abilities of individuals. But ultimately, all of the different domains are relevant for each single individual. Therefore, the joint expertise of multiple disciplines is needed to develop a comprehensive understanding on individuals. But theories and methods often cannot be easily combined across disciplines and the findings from different fields often cannot be directly compared.

In her new research trilogy, published in the international journal *Integrative Psychological and Behavioral Science*, Jana Uher therefore explored the "theories behind the theories and methods"—the meta-theories and methodologies—that researchers in different disciplines have developed about individuals. In science, this abstract level of exploration is referred to as philosophy-of-science (see the Science Blog "What is philosophy-of-science? And why is it needed?").

A central goal was to develop foundations that would be applicable in all sciences that study individuals. Jana Uher specified three properties that determine whether and how a given phenomenon can be perceived by individuals in everyday life. This down-to-earth starting point from ordinary everyday life experiences may be surprising given the abstract level of consideration taken. But the researcher explains: "All scientists are human individuals and equipped with the same perceptual abilities as everyone else. Scientists develop research methods and technologies to overcome the limitations of our human perceptual abilities for enabling explorations. Microscopes, for example, magnify the tiniest objects so that we can perceive them through the lens of microscope with our naked eye. For this reason, the three properties also determine whether and how the phenomena that we normally cannot directly perceive in everyday life can be made perceptible under research conditions."

The first property specified in the new paradigm is the localisation of the phenomenon under study in relation to the body of the individual under study. In everyday life conditions, we can directly see other people's hair and eyes, but we cannot see their bones and inner organs. Therefore, scientists have developed techniques, such as x-rays or surgery, that allow us to render such internal physical phenomena accessible to investigation.

We can also directly perceive individuals' behaviours in everyday life and in research. But we cannot directly perceive what others are thinking or feeling or the motives they may have for doing something. This entails particular exploratory challenges that are directly related to the two further properties that Jana Uher considers in her new science paradigm.

The second property is a phenomenon's extension in time. We can take our time to study and compare the hair colour and body size of individuals because these phenomena change so slowly. But studying and comparing individuals' behaviours is complicated because behaviours change dynamically from moment to moment. Therefore, in a given moment, several individuals will hardly ever do exactly the same thing. To render individuals' behaviours directly comparable, special conditions are arranged in which individuals show the same kind behaviour in parallel, such as in foot races. Then one can directly see who runs faster—even without stopping times (see Science Blog "What is 'personality'?").

Individuals' bodies and many other objects, such as chairs and mobile phones, are tangible because they consist of matter—they are material physical phenomena. But behaviours are not material objects that one can touch—they are immaterial. Behaviours are bound to the muscles by which they are produced. Therefore, direct relations between behaviours and muscles can be identified. But the muscles are there even if they are not used to produce behaviours, and the same muscles can be used to produce different behaviours, such as raising an arm to pick an apple from a tree or to catch someone's attention. Thus, behaviours are not the same as the muscles used to produce them. This refers to the third property that Jana Uher considers and that she calls physicality: the extension of a phenomenon in space.

This third property may be the most difficult one to understand as it concerns the difference between physical phenomena, such as the brain, heart beat and behaviour, and the intangible phenomena of the psyche. Specifically, we can determine the length of a wooden stick and the size and weight of a brain. We can also determine the frequency of heart beats and the length of a person's steps. Sticks and brains are material objects, heart beats are physiological phenomena and foot steps are behaviours. All four phenomena have an extension in space and are thus physical. But we cannot determine the spatial extension of a thought or an emotion that we may have. This insight was already made, amongst others, by one of the central figures in modern philosophy: Immanuel Kant who lived in the 18th century.

A key question in philosophy has always been how to identify the ways in which our bodies are connected to our minds—the body-mind problem. There is no doubt that thoughts occur in individuals' brains. We also know that individuals' thoughts and feelings are related to the brain's electrical and chemical processes. These physiological processes and the matter of the brain can be made perceptible to us, such as by using neuro-imaging techniques.

But how the body and mind are specifically connected with one another is still not well understood. One-to-one connections between individuals' physiological brain activity and their thinking and feeling obviously cannot be found. These non-spatial properties of the phenomena of the psyche are called "non-physical" in Jana Uher's new science paradigm.

This body-mind problem has fascinated not only philosophers but also quantum physicists, among them Niels Bohr. He was concerned with the puzzling findings that physicists, such as Isaac Newton and many of his contemporaries, have revealed about the nature of light. Some experiments have shown that light has the properties of electromagnetic waves; but other experiments have shown that light has the properties of particles. Now, what *is* light?

Assumptions about both properties are needed to explain the phenomena emerging from light—but how can light be comprised of both? Bohr solved this wave-particle dilemma by introducing the idea of complementarity. Both kinds of properties are needed to explain light, but in any given experiment, only one of these properties can be studied. This can be conceived of like the two sides of a coin; we can always look at just one side at a given time, but every coin always comprises both sides.

This idea became an important principle for developing knowledge about complex phenomena that feature contradictory properties. This principle provides the conceptual basis for exploring in their own rights each of the properties that can be conceived for an object of research without ignoring their existence just because they are incompatible with other properties that can be conceived for the same object of research as well.

Bohr also suggested that this principle of complementarity could be useful for exploring the body-mind problem. Everyone has both a body and a mind. Individuals cannot be comprehensively explored and understood by considering either only their bodily properties or only their psychical properties. Body and mind always function together in the single individual. But the methods required for studying bodily phenomena cannot be used to study psychical phenomena, and vice versa.

Jana Uher incorporated these ideas into her science paradigm. She criticises that different kinds of phenomena are often not clearly differentiated, such as psychical and behavioural phenomena. As a consequence, some kinds of phenomena are not properly studied. For example, psychologists often use questionnaires to study people's behaviours. But what we believe and say about what we have done is not the same as what we have actually done because this past behaviour is long over. Moreover, people's thoughts occur entirely in their heads, but behaviours occur external to their bodies. Therefore, they cannot be the same.

Similarly, the coloured images produced by neuro-imaging do not reflect people's thoughts and emotions as often assumed but only the physiological activities of their brains. These are associated with people's psychical activities but in ways that are still largely unknown. One can only infer that some thoughts and particular kinds of emotions have occurred but not which specific ones. Therefore, neuro-imaging methods cannot be used to study the thoughts and emotions that someone has while these pictures are being taken in the brain scanner.

In her new science paradigm, Jana Uher argues for a more careful consideration of the different properties that can be conceived for the different kinds of phenomena explored in individuals. Such differentiations can be made on the basis of the three properties that she considers. Because they determine the ways in which human individuals can perceive a phenomenon, these properties also determine the methods that researchers must develop for its exploration.

She demands: "Each phenomenon should be explored in its own right and with research methods that are appropriately matched to that phenomenon's particular properties. We should stop using the same method for various kinds of phenomena just because that method is considered a standard tool in a given discipline. Instead, we should critically analyse whether a given method is really suitable for exploring a particular object of research or whether alternative methods should be developed and used instead. This can be achieved only by relying on the expertise of scientists from different disciplines".

Scientific publications:

Uher, J. (2015a). Conceiving "personality": Psychologists' challenges and basic fundamentals of the Transdisciplinary Philosophy-of-Science Paradigm for Research on Individuals. *Integrative Psychological and Behavioral Science, 49,* 398-458. [Download] Online

Uher, J. (2015b). Developing "personality" taxonomies: Metatheoretical and methodological rationales underlying selection approaches, methods of data generation and reduction principles. *Integrative Psychological and Behavioral Science, 49 (4)*. [Download] Online

Uher, J. (2015c). Interpreting "personality" taxonomies: Why previous models cannot capture individual-specific experiencing, behaviour, functioning and development. Major taxonomic tasks still lay ahead. *Integrative Psychological and Behavioral Science, 49 (4)*. [Download] Online

Uher, J. (2013). Personality psychology: Lexical approaches, assessment methods, and trait concepts reveal only half of the story—Why it is time for a paradigm shift. *Integrative Psychological and Behavioral Science, 47,* 1-55. [Download] Online

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