Theory and History in the Human and Social Sciences

Davood Gozli
Jaan Valsiner *Editors*

# Experimental Psychology

## Ambitions and Possibilities

Springer

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# Contents

# Chapter 1
# Finding the Place of Experimental Psychology: Introduction


**Davood Gozli and Jaan Valsiner**

The present volume puts together a diverse set of viewpoints, all of which are addressing fundamental concerns in psychological science. Each chapter on its own provides a pathway into thinking about experimental psychology, its promises and strengths, and its limits and potential risks. We read about the historical roots of—and early debates regarding—experimental psychology (Chap. 2), the role of concepts and operational definitions (Chap. 3 and 4), the problems of external validity (Chap. 5), the organization of behavior in an experiment (Chap. 6), the interpretation of behavior in an experiment (Chap. 7), and broader philosophical frameworks that could warrant or undermine a particular line of research (Chap. 8). Together, the chapters will equip the reader to think about experimental research in a balanced, complex, and cautious manner.

From the perspective of someone strongly attached to a particular method of research, there might be no apparent limit to the application of the method. When confronting various objects of study, instead of becoming aware of the limits of the method, the researcher only considers how objects are given within the framework of the method. Insisting that universal applicability of the method, researchers unknowingly *distort* and *limit* their view of the phenomena. It would be fair to ask whether such an attitude, such rigid application of method, which never raises the question of limitation and suitability, should be called "research," given that it is more akin to the exercise and extension of power within a domain. Initial statements, like "our method works here," are soon replaced by "*only* our method *ought* to work here!"

Regardless of the particular positions taken by the authors of this volume, what is more important is the very engagement with fundamental issues. The type of writing represented in the following chapters goes beyond the strict forms in which the

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findings of experimental psychology are presented and discussed. As such, they can serve as an opening for dialogue both for people within the field who have philosophical interests and for people outside of the field who are interested in a philosophical and critical engagement with experimental psychology. Questions regarding fundamental issues are rarely raised by experimental researchers, but when they are raised, we can soon see how current research practices are connected, and arise from, certain tacit answers—given without much reflection—to those fundamental questions. How should we think about the relationship between research participant and researchers? How is that relationship grounded in our view of self/other distinction? Is there any connection and resemblance between the experimental situations, the communication between the two parties involved, and the broader context of our social-political lives outside of the laboratory? Is it possible for experimental researchers to fixate on topics that are "artificial" inventions of the field, and if so, what is the way out of such fixations?

The chapters that follow begin with a historical contextualization. Russo Krauss (this volume) gives an account of the development of scientific psychology during the late nineteenth century, with particular reference to a disagreement between Wilhelm Wundt and Richard Avenarius (see also Araujo, 2016; Russo Krauss, 2019). While that debate is relevant to questions about the place of experimentation in psychology, Russo Krauss shows why it arises from disagreements over fundamental epistemological issues, including how we think about the self/other distinction. Wundt regarded experimentation as a necessary supplement to self-observation, whereas Avenarius saw experimentation as the primary method of investigation. For Avenarius, psychology must begin with the experience of others and must maintain a third-person perspective toward the phenomena under investigation. This is, for the most part, the stance adopted by contemporary psychological science, which provides an easy bridge to neuroscientific discourse about experience and behavior. This approach encourages a third-person view of even oneself. When one thinks about one's mental life or feelings in terms of brain activity, one is adopting such a third-person scientific perspective, which might side-step the view of oneself as a person among, and in relationships with, other people.

Wundt's insistence on first-person experience, and the necessity to ground psychological science in intelligible first-person experience, is instructive for contemporary psychologists. With Avenarius, the experimental situation involves one person observing another. With Wundt, one person is setting up the conditions to help another make observation. Thus, for Wundt, the subject of the experiment remains at the center, while the two persons work together to understand one kind of experience. The distinction between first- and third-person perspectives loses its significance for Wundt, and this is reinforced by the close positions the two adopt in relation to each other, i.e., as fellow researchers. Russo Krauss concludes by reminding us that the history of psychology should teach us about the importance of maintaining a relationship between philosophy and psychology.

Heath Matheson (Chap. 3) centers his discussion on concepts. Concepts, he argues, serve as the foundation of any science, just as they serve as the foundation of our social-political lives. Matheson draws attention to the sensorimotor,

embodied basis of concepts. Pointing out the sensorimotor aspect of conceptual understanding involves acknowledging a set of constraints, which leads to the recognition of both intra-individual and inter-individual differences in understanding. It would not be surprising, Matheson argues, that crises about truth arise, if we appreciate the underlying psychological capacities that enable our evaluation of truth. His discussion shows the relevance of our topic with broader issues, e.g., political debates. He advocates moving from a realist approach to a pragmatist approach to science and taking conceptual disagreements seriously at the outset of our investigations. Matheson's contribution emphasizes concepts, largely postponing questions of methodology. It is, nonetheless, a useful demonstration of the connection between philosophy of science and psychological science. Whether or not we agree with Matheson, his argument shows that the ambitions and optimism of a psychological scientist must be grounded in some view of how science operates, why scientists disagree, and how they ought to address their disagreements.

Complementing Matheson's chapter, Roland Pfister (Chap. 4) shifts the center of discussion to methods. He points out two problematic tendencies in experimental psychology: (1) downplaying the role of tasks (i.e., method) in research and conversely (2) investigating tasks for their own sake. Downplaying the role of tasks will create a naïve sense of external validity for the research. For example, in a line of research related to human memory, not paying attention to experimental tasks can strategically replace the statement, "we are studying how participants remember these items in task X, Y, Z" with "we are studying *memory*!" At the same time, Pfister rightly points out, tasks can be over-emphasized, playing too large a role in motivating research, to a degree that the goals for which they were originally designed (i.e., knowledge about psychological phenomena) are forgotten. It might be difficult for some readers to see how these two tendencies can co-exist in the same research community, given that they seem to contradict each other. The two tendencies, however, represent two styles of engagement adopted at different times and in different settings.

When discussing research with members of their own field (at conferences, in articles published in specialty journals), discussion is focused heavily on methods and tasks, such that the tasks themselves—their limitations and the uncertainties regarding their use—creates the motivation to continue research. By contrast, when researchers take a position to talk with general audiences (writing articles in more popular journals, writing grant proposals), they set aside concerns about the tasks and refer to their research as if it has perfect external validity. Consequently, we have researchers who switch from paying too little attention to their method (highlights the aims of their research with unrealistic optimism) to paying exclusive attention to their method (forgetting the aim of their research). Pfister proposes a solution. He argues that introducing variety in operational definitions can help overcome this problem. If one psychological concept, such as rule violation, is defined in three different ways, it becomes difficult to ignore the differences in those three definitions, insofar as we remain interested in the concept that unifies them, and it becomes easier to remember why those (different) methods were constructed in the first place. Pfister also argues in favor of paying close attention to the details of

action, as well as arguing in favor of continued critical engagement with psychological research.

From a more critical standpoint, Carol Ting (Chap. 5) points out the inevitable tradeoff between, on the one hand, the ease of identification, and on the other hand, the artificiality of the behavior under investigation. In general, the easier it is for researchers to categorize behavior, the more artificial the situation has become. Ting chooses the case of dishonesty to clarify the tradeoff. Dishonesty has a social-relational dimension, which is essential to it; it is dynamic and continually responsive to what is going on. Some might continue a lie for a length of time, trying to adjust, extend, and elaborate the lie while remembering what the recipients of the lie already know. The meaning and consequences of dishonesty change with context. These consequences might include social harm, harm to one's self-image or social status, punishment, and harm to the existing trust in communities and institutions which operate on the basis of trust. Ting reviews several approaches to the experimental study of dishonesty and shows what they are missing and what they systematically exclude, by placing "dishonesty" in an experimental setting. For instance, experiments with "dishonesty" often take place in rather contrived situations, with researchers going out of their way to ensure anonymity of the participants. The experimenters isolate the "dishonest act" as much as possible from the social context, and they encourage its occurrence, in many cases, by tying it to monetary reward. Ting's argument is applicable to other areas of experimental research, whenever there is discrepancy between the operational definition of the behavior and its meaning and consequence outside of the laboratory (Gozli, 2019). It also has implication for the discussion of how concepts differ within and outside of experimental settings. Beginning with Ting's arguments, researchers could see how they could apply a similar analysis to other fields of research.

In Chap. 6, Hazeltine, Dykstra, and Schumacher (this volume) trace the development of the notion of task in recent decades in cognitive psychology. They observe that a reliance on stimulus-response (SR) associations, or "task set," is insufficient for understanding the existing evidence. A better understanding of task, they argue, is in terms of an organization of SR associations. Unfortunately, the word "response" is somewhat ambiguous, and it is not easy to see how much meaning can or should be attached to a response when we describe behavior in an experimental situation. Even though the whole (tasks) determines the meaning of the part (response), the part has a role in determining the character of the whole. What we usually mean by "response" is closer to the physical description of the movement, which risks neglecting the character of the whole (task) and the meaning assigned to individual responses. Hazeltine et al. propose that the organization of the behavior is maintained by internal representation, rather than the environment, which is why they propose the idea of "task files." The chapter includes an experiment that demonstrates how switch costs relate to task structures. The authors provide a visual representation of the association (grouping) between individual responses, which is an effective demonstration of the limits of the SR approach to understanding tasks. Moreover, their demonstration shows the limits of relying on response times as a one-dimensional variable.

Paying close attention to several lines of research, and especially attending to their methods, Davood Gozli (Chap. 7) addresses the problem of interpretation within the experimental situation. How research participants make sense of the experimental situation can change without being noticed by the researchers. Consequently, the categories researchers use in describing and explaining the findings of an experiment may not fit what happens in the experiment. For instance, while researchers assume they are comparing two conditions, which are equivalent except for the experimental manipulation, in fact there could be two qualitatively different conditions, each associated with a different set of task rules, strategies, and experiences. The reason why this major blind spot tends to go unnoticed by experimental researchers is because they impose a set of fixed criteria, as part of designing the experiment, for describing the experimental situation, while leaving out any explicitly discussion of those criteria (Gozli, 2017, 2019; see also Mammen, 2017).

In his remarkably thorough argument, Aaro Toomela (Chap. 8) turns to basic questions about science, epistemology, and methodology. Central to the chapter is Toomela's position that research methods cannot be applied without at the same time considering research questions. A method is associated with theoretical presuppositions about the object of study, whether or not researchers are aware of those presuppositions, and those could be incompatible with what is being studied. Toomela addresses along the way questions about what science is, the relationship between methods, methodology, and knowledge, drawing on Aristotle, Francis Bacon, Lev Vygotsky, and others. Turning to psychology, Toomela challenges what is often taken as the basis of many operational definitions, namely, the correspondence between behavior and psychic phenomenon. Believing we understand psychic phenomena based on isolated behaviors in the lab is not only neglecting the structural and systemic nature of psychic processes but also carrying the prejudices of researchers into the field of research. Thus, rather than adding something new to our psychological knowledge, researchers end up offering a particular demonstration of their own prejudices. Toomela reminds us that "certain methods are absolutely necessary to construct scientific knowledge but not *all* knowledge achieved by using such methods is necessarily scientific." That is analogous to pointing out that not all grammatically correct sentences are meaningful. Applying the rules of grammar on its own is not a guarantee that we are making sense. Toomela's valuable chapter shows how the questions about experimental psychology are related to more fundamental questions about knowledge. Interested readers could then explore the argument in connection to the author's earlier works on science and methodology (e.g., Toomela, 2007, 2019, 2020; Valsiner & Toomela, 2010).

Central themes and questions that emerge from the chapters include concepts and their treatment within the experimental situation, external validity, (mis)interpretation of behavior, the neglected organization of behavior—when we focus on isolated "responses," and unexamined theories of science that could keep researchers attached to a set of methods. A major strength in the chapters that follow comes from how they demonstrate the line of reasoning with a close connection to a particular research question. This is perhaps clearest in the case of Pfister (Chap. 4) and Ting (Chap. 5), who engage with experimental research on rule violation and

dishonesty, respectively, and such close engagement is necessary for fleshing out an argument, demonstrating points of contact between the mainstream psychology and theoretical-critical psychology, namely, particular cases of research.

Alongside comparable recent contributions to the critique of psychological research (e.g., Lamiell & Slaney, 2020; Uher, 2021; Valsiner, 2017), we hope this volume stimulates further reflection and dialogue regarding experimental psychology, the place of methodology in psychological science, and a turn toward foundational questions, which would not only bring depth of understanding to our scientific thinking, but also relevance to the wider context of our social-political lives. Finally, we hope the present chapters remind students and researchers that psychological writing does not have to follow the strict conventions of empirical research (i.e., the well-known sequence of Introduction, Methods, Results, & Discussion). Thoughtful critique of empirical findings, with careful attention to their presuppositions and interpretations, presented in reflective forms of writing, could just as effectively open up new pathways of thought and enable genuine advancements in scholarship.

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# Chapter 2
# From Introspection to Experiment: Wundt and Avenarius' Debate on the Definition of Psychology


**Chiara Russo Krauss**

## Aim of the Paper

This paper provides an account of the debate between Wilhelm Wundt and Richard Avenarius on the definition of psychology. It shows that – despite the fame of the former as the founder of experimental psychology – it was the latter who first defined this science on the basis of the experimental method. Moreover, the paper reconstructs how Avenarius elevated physiological experiment to the rank of a paradigm, using it to define not only psychology but also the relationships between this science and knowledge in general. In so doing, Avenarius elaborated a groundbreaking conception of psychology that anticipated several topics of later debate on this science. Finally, we will show how Avenarius' attention to the interactions between philosophy, psychology, and the concrete practice of science can still be instructive today.

## Historical Background

Since the Scientific Revolution in the sixteenth to seventeenth centuries, the definition of science was based on two fundamental and interrelated requirements: the mathematization of knowledge and the adoption of the experimental method, which is one of the conditions for this mathematization. Accordingly, physics was regarded as the model for all other sciences. In the following centuries, as new branches of knowledge started to develop, the question of whether they could be considered

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sciences in the proper sense of the word overlapped with the question of the applicability of mathematics and experimentation in their fields.

In the case of psychology, this approach is evident in the work that became a reference point for the entire debate on the establishment of this science in the nineteenth century: Immanuel Kant's Preface to the *Metaphysical Foundations of Natural Science*. In it, Kant stated "that in any special doctrine of nature there can be only as much proper science as there is mathematics therein" (Kant, 1786/2004, 6). Consequently, for Kant psychology, "the empirical doctrine of the soul" could not aspire to "the rank of a properly so-called natural science," for two reasons, because "mathematics is not applicable to the phenomena of inner sense and their laws" and because the method of "systematic art of analysis or experimental doctrine" does not fit with "inner observation," and "still less does another thinking subject suffer himself to be experimented upon to suit our purpose" (Kant, 1786/2004, 7).

In the nineteenth century, several thinkers tried to challenge Kant's negative answer to the question of the fate of scientific psychology.[1] Johann Friedrich Herbart believed that physics was possible thanks to its metaphysical foundation, i.e., the construction of the ideas of matter and force to make sense of the contradictions of experience and to provide the necessary basis for calculation. Consequently, he wanted to do the same for psychology, proposing a mathematized "psychical mechanics" based on the dynamics between "representations" that oppose each other like "forces" (Herbart, 1816/1901, 6).[2] However, despite Herbart's undeniable lasting influence, his attempt was soon abandoned as Gustav Theodor Fechner proposed a new psychophysical and experimental approach. Unlike Herbart, he believed that science should adhere to experience. For him, physics was based on outer observation, and psychology on inner observation. Therefore, Fechner believed that it was impossible to *directly* experience the connection between the physical and the psychical, since "no one can have an outer and inner perspective on the same thing at once" (Fechner, 1860, 5). Nonetheless, he admitted the possibility of experimentally investigating the *indirect* but lawful relationship between the two. Given the measurability of physiological data, the psychical phenomena could be expressed as a function of those data. On this basis, Fechner established "psychophysics as the exact science of the functional relationships between body and soul" (Fechner, 1860, 8).[3]

As we can see, Kant, Herbart, and Fechner, apart from their differences, were all convinced that physics was the model for all sciences and that psychology, in order to ascend to the rank of science, should imitate this model. However, during the

[1] For a brief account of the early debate on scientific, experimental psychology, see Kim, 2009. For a more comprehensive analysis of this debate in the nineteenth century, see Teo, 2005, 39–92, and Fahrenberg, 2015.

[2] For more details on Herbart, see Beiser, 2014, 89–141. About Herbart's psychology and his fortune, see Boudewijnse et al., 1999 and 2001.

[3] On Fechner see Heidelberger 2004. However, Fechner maintained some elements of Herbart approach (on this topic see Murray & Bandomir, 2001).

nineteenth century, a new attitude toward this issue began to develop. More and more thinkers started to distinguish the so-called *Geisteswissenschaften* (i.e., the "spiritual," "moral," or "human" sciences) from the natural sciences, stressing that the two had different objects, goals, and methods. The best example of this trend is Wilhelm Dilthey.[4] He criticized the "constructive psychology" that adopted the "explanatory" (*erklärende*) method of natural sciences, i.e., the reduction of phenomena to a set of simplest elements (such as atoms or sensations) and their laws of connection. For Dilthey, this method was suitable only for the knowledge of natural phenomena, since we experience them from the outside and separately, without access to their inner relationships. Conversely, in the case of the human phenomena that are the subject of spiritual sciences, we have a direct "understanding" (*Verstehen*) of the "living nexus" that intrinsically characterizes them. Thus, Dilthey supported a "descriptive psychology" based on the immediate living experience of the interconnectivity that is typical of spiritual phenomena. For him, such a psychology was not only a spiritual science but the very foundation of all spiritual sciences (see Dilthey, 1894/2010).

## Wilhelm Wundt Between Introspection and Experiment

In textbooks, Wilhelm Wundt (1832–1920) is usually regarded as the father of experimental and physiological psychology.[5] While Fechner established psychophysics as the science that studies the relationship between mind and body, Wundt adopted Fechner's psychophysics to use as a method for the investigation of purely psychological phenomena. In the Preface to his seminal *Principles of Physiological Psychology*, Wundt explicitly stated his intention "to mark out a new domain of science," i.e., "the experimental treatment of *psychological* problems" (Wundt, 1874, III, emphasis mine). Moreover, in 1879 Wundt founded the Institute of Experimental Psychology in Leipzig (Germany) which – apart from being one of the first of its kind – became the Mecca of the new psychology, attracting students and researchers from all over the world. Finally, in his writings on the status of psychology, Wundt criticized the method of self-observation, comparing it to the attempt of Baron Munchausen to save himself from drowning in a swamp by pulling his own hair (Wundt, 1882/1906, 198).

[4] On Dilthey's critique of psychology, see Teo, 2005, 78–84, Hodges, 2000, 196–224.

[5] For a thorough analysis of Wundt's reception, especially in textbooks, see Fahrenberg, 2011, 125–130, and Fahrenberg, 2020, 218–264. Many accounts of Wundt's ideas in the histories of psychology were distorted by blatant errors and incomprehensions. However, in the last decades, some authors have produced works that correct these mistakes and provide a correct understanding of Wundt's conceptions, such as Rieber & Robinson, 2001, Araujo, 2016, and the already mentioned Fahrenberg, 2020. These works have been preceded by the researches of Kurt Danziger, who paved the way for all the recent investigations on Wundt (see Danziger, 1979, 1980a, b, 1987, 2001).

In view of this, the situation seems clear: Wundt is and should be considered a representative of the tendency that aimed at making psychology scientific (in the sense of physics), by rejecting introspection in favor of the new physiological-experimental method. However, on closer examination, this account of Wundt's position turns out to be false.

First of all, Wundt believed that psychology occupied a "mediating position between the natural and the spiritual sciences." Or, more precisely, he sided with Dilthey, who regarded it as merely "related" to the natural sciences but as the very "fundamental discipline of the spiritual sciences." The reason was that "every expression of the human spirit has its last cause in the elementary phenomena of the inner experience," which is the subject matter of psychology (Wundt, 1874, 4).[6] Indeed, his criticism of self-observation did not challenge the assumption that introspection is the fundamental method of psychology. Wundt rejected self-observation only insofar as it implies intention and effort, since attention dissolves the mental phenomenon we are trying to analyze. For him, "the more we strive to observe ourselves, the more certain we can be that we are observing nothing at all." So, instead of self-observation, he suggested that psychology should rely on "fortuitous inner perception" (Wundt, 1882/1906, 197–198).[7] Needless to say, he was aware that this "uncertain ground" was not sufficient to establish a science. And this is where the experiment came into play, allowing for a "deliberate renewal of inner processes" "under the same or voluntarily modified conditions." Hence, Wundt recognized the need for psychological experiments as "auxiliary means" to support the method of self-observation (Wundt, 1888a, 301–303).

Accordingly, Wundt distinguished three phases in the history of psychology. The first is the "physiological phase." In it, as Kant said, "inner experience is regarded as a field inaccessible to experimental method, and therefore to all exact investigation." Consequently, "the only task of experimental method is considered the investigtion of the physiological basis of the psychical." The second is the "psychophysical phase," represented by Fechner. In this phase, it is still held that "no experiment can be applied to purely psychical interactions." Still, assuming the "functional relationships" between physiological and psychical phenomena, the experimental method is extended to the investigation of the "psychophysical interactions" "between body and soul." Finally, in the third and purely "psychological phase," the "physical causes *no longer count as members of a functional relationship*, since, strictly speaking, such a relationship is possible only between members *of the same kind*, i.e. between physical and physical, or between psychical and psychical elements."

[6] The definition of psychology as the science that deals with the "immediate experience," which is often associated with Wundt, was introduced in a second phase of his career, as a direct reply to the new definition of psychology developed by Avenarius and Mach, and adopted by several of Wundt's pupils (see Russo Krauss, 2019, 113–117).

[7] The ambiguity of Wundt's position – who apparently rejects self-observation, only to admit it immediately afterward in the form of inner perception – created misunderstandings even then. Johannes Volkelt criticized Wundt's rebuttal of self-observation (Volkelt, 1887), thus pushing Wundt to reply, to explain that he was actually favorable to introspection (Wundt, 1888a).