

PSYCHOLOGY OF INDIVIDUAL DIFFERENCES WITH PARTICULAR REFERENCE TO TEMPERAMENT

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Contents

1. Historical Perspective
 2. The Concept of Individual Differences and Main Categories to Describe Them
 - 2.1. The Psychology of Individual Differences
 - 2.2. Trait as the Basic Category for Describing Individual Differences
 3. Temperament as a Component of Personality
 - 3.1. Founders of Contemporary Research on Temperament
 - 3.1.1. Eysenck's Biological Theory of Psychoticism, Extraversion, and Neuroticism (PEN)
 - 3.1.2. The Interactional Theory of Temperament Developed by Thomas and Chess
 - 3.2. The Status of Temperament Research during the Last Quarter of the Twentieth Century
 - 3.2.1. Child-Oriented Approaches to Temperament
 - 3.2.2. Adult-Oriented Theories of Temperament
 4. The Functional Significance of Temperament
 - 4.1. Arousal and Arousability as Constructs that Explain Individual Differences in Experiencing Stress
 - 4.2. Temperament as a Moderator of Stress
- Acknowledgements
Glossary
Bibliography
Biographical Sketch

Summary

After a historical introduction, the concept of individual differences and the psychology of individual differences are discussed. Units (categories) by means of which individual differences can be described are introduced by showing the special place of the concepts of type and trait. Trait understood as a tendency to behave (react) in a given way expressed in a given category of varied situations is regarded as the basic category aimed at describing individual differences in personality (including temperament). The status of traits, their determinants, and ways they express themselves are presented. This article concentrates on temperament as a spectacular phenomenon in which individual differences are expressed. The contribution of the founders of contemporary research on temperament is presented but limited to the biological theory of extraversion, neuroticism, and psychoticism as developed by Eysenck, and to the interactional theory of temperament as introduced by Thomas and Chess. Theories that developed during the last quarter of the twentieth century are discussed briefly, taking into account the child-

oriented approach as well as the adult-oriented one. Special attention has been paid to the functional significance of temperament, which seems to be one of the main issues in future research on temperament. In this context the relationship “temperament–stress” has been viewed from several perspectives.

1. Historical Perspective

From the beginning of time people have paid attention to the fact that individuals differ from each other. In the same situations they behave differently and the same individuals when confronted with different situations show some consistency in their behavior in spite of the situational diversity. Individual differences (I.D.) occur in all characteristics of individuals: their body, their mental traits, and their behavior, as well as in the artifacts that individuals create.

Since ancient times, differences among people have been considered by men of learning, especially by philosophers and physicians. The ancient Greek physician and philosopher Hippocrates (460–377 B.C.E.) developed the idea that a given composition of four cardinal humors (Gr. *sanguis*, *chole*, *melas chole*, and *phlegma*) is the main source of health or sickness. The idea of a blending of four basic humors in different proportions became very fruitful more than five hundred years later. Galen (C.E. 130–200), another famous physician of ancient Greece, used Hippocrates’ ideas to develop the first theory of temperament, introduced in his work *De temperamentis*. The four basic temperaments he distinguished became the most popular temperament types well known even now: sanguine, phlegmatic, choleric, and melancholic. The main criterion for distinguishing them was the predominance in the organism of one of the four humors mentioned by Hippocrates. A detailed description of a diversity of human personalities was introduced by the philosopher Theophrastus from Eresos in his work *Characters*. He argued that these diversities are mainly due to environmental influences. The two different perspectives represented in views of the causes of I.D.—inside the body (the humors) as proposed by Hippocrates and Galen, or outside the organism (environment) as suggested by Theophrastus—have given way to the distinction between endogenous and exogenous theories of personality.

Most influential in molding the science of I.D. was the period beginning with the second half of the nineteenth century. One must start with Charles Darwin’s theory of evolution where the importance of I.D., albeit biological in nature, was expressed more strongly than ever before. In 1859 in his work *The Origin of Species* he argued that inherited I.D. in the same species are one of the main sources of natural selection and adaptation to the environment.

Influenced by Darwin’s ideas, Francis Galton provided the first empirical evidence to show the importance of heredity in determining the variation of abilities. He was the first to set up an anthropometric laboratory in London in order to measure body and psychomotor characteristics. In his book *Human Faculty and Its Development* published in 1883 he described a variety of characteristics in which individuals differ, such as bodily qualities, sensory sensitivity, mental imagery, color associations, etc. In the same book he put forward one of the most fascinating issues in psychology: the question of “nature or nurture?” to which his answer was that it is mainly heredity that determines I.D.

The psychometric approach initiated by Galton was further developed by McK. Cattell. His psychological laboratory was the first in the USA where tests were used for examining I.D. Like his master—Galton—he concentrated on measuring rather simple psychomotor reactions with the belief that on that basis it would be possible to describe complex mental processes.

A milestone in the development of the I.D. approach was the contribution of the French psychologist Alfred Binet. In 1905 the first intelligence scale was published, the joint work of Binet and Simon. The test was intended to diagnose mentally retarded children in schools. Binet also introduced the concept of “mental age,” which should be regarded as the first step in developing the idea of the intelligence quotient.

The survey of multinational contributions should include the impact of German psychologists, the most significant of whom was William Stern. In 1900 he outlined in the book *Über Psychologie der individuellen Differenzen* the topic and main problems of the psychology of individual differences (PID) as a separate discipline. Most experts in the field of I.D. consider this date the beginning of PID as a science. Of special importance for measuring intelligence was the introduction of the intelligence quotient by Stern in 1912. This made possible comparisons in the level of intelligence among individuals differing in age.

The psychometric approach, already present in studies on intelligence, appeared about 20 years later in research on temperament. Two Dutch psychologists, Heymans and Wiersma, developed a typology referring to a specific configuration of three temperament traits (emotionality, activity, and perseveration [i.e. *duration* rather than persistence of reactions]) based on inventory measures collected from more than 2500 people.

Of considerable importance for the development of PID, especially in east European countries, was the contribution of the Nobel Prize winner Ivan Pavlov. Studying conditioned reflexes in dogs he noticed numerous differences between animals in the speed, ease, and magnitude of these reflexes. Based on these observations Pavlov developed in the second decade of the twentieth century a typology based on a specific configuration of nervous system properties—strength of excitation, strength of inhibition, balance of nervous processes, and mobility of nervous processes. The four types distinguished by Pavlov are regarded as the physiological basis of the ancient Greek temperament typology. So, then, (1) the sanguine was characterized as a strong, balanced, and mobile type, (2) the phlegmatic as a strong, balanced, and slow type, (3) the choleric as a strong, unbalanced type, and (4) the melancholic as a weak type of nervous system.

This short and very selective review shows that PID has benefited from many facts and ideas collected over a long period.

2. The Concept of Individual Differences and Main Categories to Describe Them

The many data collected over centuries and based mainly on observation allow us to conclude that I.D. between people are universal (common). This means that there do not exist physical, psychic, or behavioral characteristics in which people do not differ.

Spectacular evidence in favor of the universality of I.D. comes from genetics. Although individuals belonging to the human species share the same number of chromosomes, their genetic endowment is unique. Among all living human beings there do not exist two individuals (except monozygotic twins) that are genetically identical. This statement refers to all other mammalian species, and probably to all vertebrates.

2.1. The Psychology of Individual Differences

I.D. is the phenomenon by which individuals (people and animals) being members of the same population differ among each other in respect to physical, behavioral, and psychic characteristics. The populations to which I.D. refer may be of different kinds and sizes (e.g. all people currently living, all women in a given community, or all students attending a specific high school).

Since I.D. are universal they can be observed everywhere in all kinds of processes, reactions, behaviors, states, and traits. But PID includes only those that might be characterized as being relatively stable, that do not vary from moment to moment or from day to day. Taking this criterion into account, PID covers such areas as intelligence, abilities, and cognitive style (see *Thinking and Problem Solving*), personality (see *The Social Psychology of Personality*), and temperament. Because of limited space this article focuses on temperament as one of the basic domains of trait-oriented personality.

The phenomena on which PID concentrates may be described mainly by such units as disposition, trait, factor, dimension, style, and type. Although they have a different status, all are based on the assumption that the phenomena to which PID refers are relatively stable (known as cross-temporal stability). Among them the concepts of type and trait have a special position. Type, which refers to a dominant disposition or configuration of traits that distinguish one group of people from another group of people, has to be regarded as a unit of classification. Type is not ascribed to individuals but is a category allowing us to classify individuals by means of given criteria. Individuals do not possess a type but belong to a given type.

Depending on the context, the construct of trait may be replaced by all other units but type. Hence we often use the terms (1) dimension—when the quantitative aspect in I.D. is taken into account; (2) factor—when the procedure of separating traits is based on factor analysis; (3) disposition—when we underline the endogenous character of traits; (4) style—when the stylistic (the “how”) aspect of a trait is considered.

One of the essential issues in PID is the causes of I.D. A taxonomy based on a dichotomous distinction reduces all factors determining I.D. to heredity and environment. It is behavior genetics (see *Psycho-Genetics and Genetic Influences on Behavior*) that supplies the main evidence for the contribution of genes and environment (including their specific components) to I.D. in behavior and traits.

The twin method, adoption studies, and family studies are the main sources on which human behavior-genetic data are based. This article refers to selected results showing the importance of genes and environment in determining I.D. in temperament.

2.2. Trait as the Basic Category for Describing Individual Differences

The construct trait, understood as the basic unit of personality, was introduced in a most systematic way by Gordon Allport. Most trait-oriented personality psychologists consider trait a relatively stable and individual-specific generalized tendency to behave in a certain way expressed in a given category of varied situations.

The concept of trait was the object of a thorough critique from several points of view. The attack against this concept has its roots in data collected by Hartshorne and May. Their study, conducted in the 1930s and centered on measuring honesty as a trait, has shown that there was not much consistency among children when the same trait—honesty—was measured on different occasions, especially when children were given the opportunity to deceive. Taking this study as a starting point, Walter Mischel issued the strongest challenge to trait theory. He demonstrated data showing that different measures of actual behavior assumed to be expressions of the same trait do not correlate with each other. At best their correlation does not exceed 0.30 when a questionnaire measure of a personality dimension is related to any external criterion of this dimension. Under the influence of Mischel’s critique of traits, arguments have been collected in favor of this construct. They show under which conditions and circumstances the situation (environment) is what allows us to predict behavior, and under which it is the trait (person) that has this predictive power (see Table 1).

Circumstances	Dominant contribution to the variance of behavior	
	Situation	Trait
Repeatability of observation	Single observation	Repeated observation
Duration of observation	Brief	Extensive
Degree of variety of behavior	Single act	Broad range of many behaviors
Possibility to express behavior	Limited	Unconstrained
Possibility to choose situations	Absent	Unlimited
Possibility to create situations	Does not exist	Exists
Novelty of situation	Novel	Familiar
Kind of situation	Experiment	Natural situation

Table 1. Circumstances under which the preference for situation (environment) or trait as factors determining I.D. in behavior occurs

One of the crucial issues is the ontological status of a trait. This issue becomes critical when we refer to phenomena that occur not only in children and adults but that are also present in newborn babies and animals and in respect to which I.D. cannot be explained without referring to heredity.

Traits are expressed in reactions, behavior, or states but cannot be reduced to these phenomena. They are determined by internal (inborn and acquired) mechanisms but, again, cannot be reduced to these mechanisms. Traits are the result of a given interaction among a variety of internal mechanisms; they have a specific status

expressed in the **tendency** to behave (react) in a given way. This tendency, being more or less consistent and stable, inborn, or acquired, may be modified by external conditions such as learning and other enduring environmental factors. Since the biological bases determining traits are far from being familiar and identified, traits have the status of **hypothetical constructs**. Figure 1 illustrates the hypothetical status of traits, their determinants, ways they express themselves, variables that mask, hamper, or modify these expressions, and also shows the ways traits can be assessed.

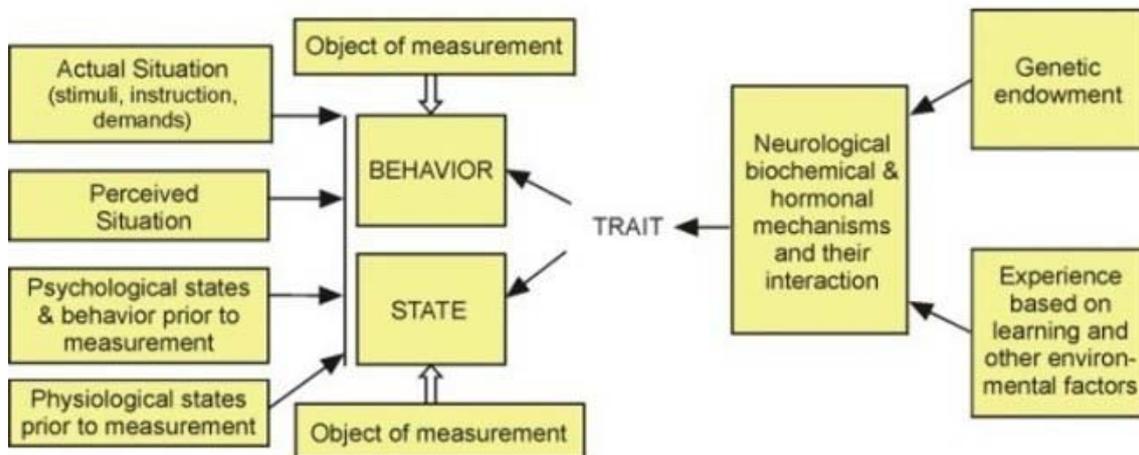


Figure 1. Hypothetical status of a trait

When talking about the biological bases of traits or factors, personality researchers refer to different physiological or biochemical mechanisms depending on the theory underlying personality. It has to be asked what are the determinants of the biological structures and functions underlying personality, including temperament. The many data based on behavior-genetic methods allow for a conclusion that heredity is an essential factor contributing to I.D. (phenotypic variance) of many personality traits, especially the ones related to temperament. It has to be remembered, however, that we do not inherit temperament or personality *per se*. Tendencies (of behavior and reactions) (i.e. traits) as such cannot be inherited because there does not exist a single biological substratum ascribed to them. In other words, one does not inherit anxiety, aggression, or activity but only biological mechanisms that heighten or lessen the probability that such traits will develop. There must be structures and mechanisms of a biological nature, such as physiological, neurological, biochemical, and hormonal, that are transferred genetically. In their activity and reactivity, and trait-specific interactions among those biological variables, I.D. determine the more or less stable tendency to behave (react) in a given way.

Biological structures and functions develop also under the influence of environmental factors, including the physical environment (nutrition, temperature, etc.) as well as the social (upbringing, learning, social interactions, etc.). One may assume that the environmental influences and results of learning when internalized and consolidated are reflected in the brain as individual-specific more or less persistent neural networks or—in a terminology adopted from Piaget—as enduring schema developed under the process of assimilation and accommodation. These schema or neural networks contribute to the development of traits. Studies conducted since the early 1970s have

shown that it is the environment that seems to be at least equally responsible in determining I.D. in temperamental traits. Many studies demonstrate that in case of temperament (this refers also to many other personality traits) it is the non-shared environment (which causes members of the same family to be different from each other) that mainly contributes essentially to their phenotypic variance.

As already mentioned, this article will concentrate only on temperament regarded as spectacular phenomena in which individuals differ.

3. Temperament as a Component of Personality

For the purpose of this article temperament is defined as a phenomenon that refers to basic, relatively stable personality traits that are present since early childhood, occur in people, and have their counterpart in animals. Being primarily determined by inborn neurobiochemical mechanisms, temperament is subject to slow changes caused by maturation and individual-specific genotype—environment interplays. Instead of giving a systematic view on the development of temperament theories and research, this article will concentrate on selected issues such as founders of contemporary temperament research, recent child-oriented and adult-oriented temperament theories, and functional significance of temperament.

3.1. Founders of Contemporary Research on Temperament

When we attempt to tap the beginnings of contemporary interest in temperament, accompanied by the original approaches, our attention is drawn particularly to the following scholars active in three different countries: Hans J. Eysenck in England, Alexander Thomas and Stella Chess in the United States, and Borys M. Teplov in Russia. Teplov's pioneering research on temperament, although very influential in all states of the former Soviet Union as well as in eastern Europe, did not greatly affect the research on temperament in other countries, and therefore his contribution—known as the neo-Pavlovian approach to temperament—will not be discussed here.

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Biographical Sketch

Jan Strelau is senior professor of psychology at the Warsaw School of Social Psychology and founder and chair of the Interdisciplinary Center for Behavior Genetic Research, University of Warsaw. Professor Strelau is a full member of the Polish Academy of Sciences and Academia Europaea, holding honorary doctorates from the University of Gdansk (Poland) and the State University of Humanistic Sciences in Moscow (Russia). He is one of the founders and first president (1984–1988) of the European Association of Personality Psychology. In 1993–1995 he was president of the International Society for the Study of Individual Differences and in 1996–2000 was vice-president of the International Union of Psychological Science.

For 15 years he was editor-in chief of the *Polish Psychological Bulletin*, and since 1996 has been associate editor of the *European Psychologist*. He is also a member of editorial boards on several journals. Professor Strelau has authored more than 200 papers and book chapters, and authored or (co)edited 32 books in the field of individual differences, especially on temperament and related topics, among the most recent of his books being *Temperament: A Psychological Perspective* (1998), whereas his *Temperament, Personality, Activity* (London: Academic Press, 1983) is the most often cited.

Professor Strelau's current research concentrates on behavior-genetic studies on temperament and on temperament as a moderator of stress phenomena. He has won, among others honors, the International Humboldt Research Award (Humboldt Preisträger), the Max Planck Research Award (together with Alois Angleitner) "in recognition of outstanding international achievements in personality research," and the 1997 New Europe Prize (jointly administered by six Centers for Advanced Studies: Stanford, Princeton, North Carolina, NIAS, Uppsala, and Berlin).