

Chapter 2

The S-O-R-Model

Abstract The realistic S-O-R-model is presented. This model simply pictures that stimulation and human behavior (reaction, action) are linked by an organismic component. The structures and processes that constitute this component are biological (sense organs, nervous system, muscular system) and psychological. Psychological analyses are guided by scientific concepts such as learning, perception, emotion, motivation and thinking. A more general concept is mental activity that can be subdivided into mental states (emotions, imagery, thoughts) and mental processes (judgment, thinking, appealing to oneself, asking oneself) as a function of stimulation, motivation, experience, and knowledge. Perception and mental activity that are based on the activity of neural systems are core components of self-regulation in the course of interactions with objects, machines, animals, or persons. Self-regulation is the coordination of actual states (ongoing stimulation, mental states) with desired or necessary states. The desired or necessary state is the dominant motive (basic value, need, commandment, duty, or interest).

The most suitable theoretical background for basic psychological and psychiatric concepts is the S-O-R (stimulus-organism-response) extension of the behavioristic S-R formulation that was proposed by Woodworth in 1954 (Royce 1967). Figure 2.1 shows the general form. But which attributes characterize a contemporary version of the model?

The S-O-R-model is a realistic model (like a model of an architect). The question is what is located between S and R, and what happens between S and R. A neurobiologist would answer that the sense organs, the nervous system and the muscular system are located between stimuli and behavior and that these systems interact in a lawful way. The processes involved are mainly influenced by the existing stimulation, for example temperature, light, tones or words. According to psychology, it is necessary to distinguish between innate and learned behavior. Learned behavior is predominantly based on stimulation and perceptual learning (Sect. 3.2). With reference to the S-O-R-model, psychological structures and processes can be analyzed that mediate between stimulation and behavior. Such analyses are guided by the use of appropriate concepts. For example, if a child

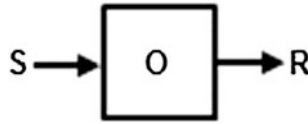


Fig. 2.1 The general S-O-R-model (S = stimulation, O = organism, R = behavior)

recognizes an object as a rose, then we can speak of perception. Other important scientific concepts (constructs) that are used to indicate an intermediation between stimulation and behavior are emotion, motivation, attitude or reasoning.

The S-O-R-model can also be a useful reference system for the concept of personality and for subcategories such as education or personality traits (e.g., extraversion, neuroticism). This is not the place, however, to discuss the variety of controversial theories of personality. Here is only important that evidence indicates that human behavior is not simply determined by the environment or by traits or by additive environment-trait-interactions (e.g., Bandura 1999; Barrett 2006; Mischel 2004; Wegner and Vallacher 1977, pp. 68–74).

Determination of behavior by additive environment-trait-interactions would mean that valid measures of a trait (e.g., an anxiety test) and valid measures of situations that are relevant for this trait (e.g., a listing of more or less anxiety-releasing situations) are sufficient to predict the behavior of single persons. For example, people with a very low anxiety score will behave always less anxiously than persons with a very high anxiety score. In a threateningly situation, both groups of persons will behave more anxiously than in a situation that is harmlessly.

However, non-additive environment-trait-interactions are very common. This means that the human behavior is usually a complex function of interacting factors. With respect to the S-O-R-model, the most general factors are the stimuli (S), which are material (e.g., luminosity, light), organic (e.g., stomach pains) or social (e.g., a facial expression), and the organismic component (O). Psychological concepts that indicate functions of the organismic component include perception, emotion, judgment, thinking, and motivation. The best example of the interaction of the stimulation with the organismic component is the ambiguity of stimuli, that is, of an object, a machine, an animal or a person. Often the ambiguity of stimuli is even inevitable. The interpretation depends on various factors, including the stimulus context, some form of social priming, the level of arousal, experience, motivation, and thinking (the search for a proper interpretation). Consequently, the interpretation influences the emotional state, the motivation to interact and the resulting behavior. In the case of an interaction with another person, the behavior that is based on the interpretation of an ambiguous stimulus acts as a social stimulus that is clear or ambiguous. This influences the further progress of the communication. Essentially, this means the occurrence, resolving or avoiding of disturbances (disorders, conflicts).

Contrary to additive environment-trait-interactions, non-additive environment-trait-interactions reduce the practical usefulness of personality tests considerably. Furthermore, basic traits such as intelligence, aggressiveness, neuroticism, and

anxiety cannot be defined in an objective way such as temperature, mass, or other physical values. In addition, the classification of mental disorders is controversial (Sect. 6.2.1). Therefore, a fundamental modification of clinical practice is necessary (Sect. 6.2).

In any case, perception and mental activity are influential links between stimulation (S) and action (R). The goal of neural science is to understand the biological mechanisms that account for mental activity (Albright et al. 2000). An overview of possible forms of mental activity is the basis for a converging psychological and neurobiological analysis of essential structures and processes.

Mental life consists of mental states (emotions, imagery, thoughts) and mental processes (judgment, thinking, appealing to oneself, asking oneself) as a function of stimulation (material, organic, social), motivation, experience, and knowledge. Mental states, however, can also be influenced by mental processes. Pondering, for example, can lead to negative emotions.

Perception, mental states and mental processes that are based on the activity of neural systems are core components of self-regulation in the course of interactions with objects, machines, animals, or persons (Sects. 3.1–3.3).

Self-regulation is the coordination of actual states (ongoing stimulation, mental states) with desired or necessary states (dominant motives). The dominant motive determines the behavior (Sect. 6.1). This definition is broader than the usual definition. Usually self-regulation is defined synonymously to self-control (Bandura 1999; Carver and Scheier 2011; Carver et al. 2000; Karoly 1993). Self-regulation that is automatic or controlled (reflective) is mainly a function of the prefrontal cortex (Sects. 3.3.4 and 5.6).

By reference to the S–O–R-model, it became clear that information processing is some form of feature processing (e.g., Anderson 1962, 1981). The assumption of information integration (mental, neural and neuro-mental computation by algebraic rules), however, is not correct. Section 3.4 proves that the brain does not employ algebraic rules in the field of perceptual processing and in other fields. Chapters 4 and 5 provide new insights into various valid modes of feature processing, including the judgment process, an empirical foundation of scales for stimuli with qualitative or quantitative features as well as the effects of neuronal feature detectors and of features of memory structures.

The understanding of the principles, functions, and neural basis of perception, mental processes, and self-regulation leads to conclusions about the causes of behavior and has implications for psychiatric nosology and practice (Chap. 6).

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