

Chapter 14

Eysenck's Biologically Based Factor Theory

Learning Objectives

After reading this chapter, students should be able to accomplish the following objectives:

1. Explain the basics of factor analytic methods.
2. Describe Eysenck's approach to the measurement of personality.
3. Name and explain Eysenck's criteria for identifying factors.
4. Name and describe Eysenck's three general personality dimensions, or superfactors.
5. Describe how Eysenck's three superfactors relate to and predict behavior.
6. List and describe the three bipolar dimensions of personality described by Eysenck.
7. Explain how Eysenck's theory of personality relates to disease.
8. Briefly define the characteristics of someone who is high on extraversion or high on introversion.
9. Describe the three basic dimensions of personality as postulated by Eysenck and his view of how biology can influence personality.

Lecture Outline

I. Overview of Biologically Based Trait Theory

Eysenck developed a factor theory much like McCrae and Costa, but because he fundamentally based his taxonomy in both factor analysis and biology, he derived only three, rather than five, dimensions of personality—extraversion/introversion, neuroticism/stability, and psychoticism/superego.

II. Biography of Hans J. Eysenck

Hans J. Eysenck was born in Berlin in 1916, but as a teenager, he moved to London to escape Nazi tyranny. Eysenck was trained at the psychometrically oriented psychology department of the University of London, from which he received a bachelor's degree in 1938 and a PhD in 1940. Eysenck was perhaps the most prolific writer in the history of psychology, and his books and articles often stirred worldwide controversy. He served as professor emeritus at the University of London until his death from cancer on September 4, 1997.

III. Eysenck's Factor Theory

The personality theory of Hans Eysenck has strong psychometric and biological components. However, Eysenck (1977a, 1997a) contended that psychometric sophistication alone is not

sufficient to measure the structure of human personality and that personality dimensions arrived at through factor analytic methods are sterile and meaningless unless they have been shown to possess a biological existence.

A. Criteria for Identifying Factors

With these assumptions in mind, Eysenck listed four criteria for identifying a factor:

- First, *psychometric evidence* for the factor's existence must be established.
- A second criterion is that the factor must also possess *heritability* and must fit an established genetic model.
- Third, the factor must *make sense from a theoretical view*.
- The final criterion for the existence of a factor is that it must *possess social relevance*.

B. Hierarchy of Behavior Organization

Eysenck (1947, 1994c) recognized a four-level hierarchy of behavior organization:

- At the lowest level are *specific acts or cognitions*, individual behaviors or thoughts that may or may not be characteristic of a person.
- At the second level are the *habitual acts or cognitions*, that is, responses that recur under similar conditions.
- Several related habitual responses form a *trait*—the third level of behavior.
- Eysenck concentrated on the fourth level, that of **types** or superfactors.

IV. Dimensions of Personality

Many current factor theorists insist that ample evidence exists that five—and no more and no fewer—general factors will emerge from nearly all factor analyses of personality traits.

Eysenck, however, extracted only three general superfactors. His three personality dimensions are:

- **extraversion (E)**,
- **neuroticism (N)**, and
- **psychoticism (P)**.

He did not rule out “the possibility that further dimensions may be added later” (Eysenck, 1994b, p. 151). All three are bipolar, with extraversion being at one end of Factor E and **introversion** occupying the opposite pole. Similarly, Factor N includes neuroticism at one pole and **stability** at the other, and Factor P has psychoticism at one pole and the **superego function** at the other.

A. Extraversion

Extraverts are characterized primarily by sociability and impulsiveness but also by

jocularity, liveliness, optimism, quick-wittedness, and other traits indicative of people who are rewarded for their association with others (Eysenck & Eysenck, 1969), whereas introverts can be described as quiet, passive, unsociable, careful, reserved, thoughtful, pessimistic, peaceful, sober, and controlled. Eysenck (1982, 1997a) believed that the primary cause of differences between extraverts and introverts is one of *cortical arousal level*, a physiological condition that is largely inherited rather than learned.

B. Neuroticism

Like extraversion/introversion, neuroticism/stability has a strong hereditary component. People who score high on neuroticism often have a tendency to overreact emotionally and have difficulty returning to a normal state after emotional arousal. They frequently complain of physical symptoms, such as headache and backache, and of vague psychological problems such as worries and anxieties.

Eysenck accepted the **diathesis–stress model** of psychiatric illness, which suggests that some people are vulnerable to illness because they have either a genetic or an acquired weakness that predisposes them to an illness. This predisposition (diathesis) may interact with *stress* to produce a neurotic disorder.

C. Psychoticism

Like extraversion and neuroticism, P is a bipolar factor, with psychoticism on one pole and *superego* on the other. High P scorers are often egocentric, cold, nonconforming, impulsive, hostile, aggressive, suspicious, psychopathic, and antisocial. People low on psychoticism (in the direction of superego function) tend to be altruistic, highly socialized, empathic, caring, cooperative, conforming, and conventional (Eysenck, 1997).

V. Measuring Personality

Eysenck evolved four personality inventories that measure his superfactors. The first, the Maudsley Personality Inventory (MPI; Eysenck, 1959), assessed only E and N and yielded some correlation between these two factors. For this reason, Eysenck developed another test, the Eysenck Personality Inventory (EPI). The EPI contains a lie (L) scale to detect faking, but more importantly it measures extraversion and neuroticism independently, with a near-zero correlation between E and N (H. J. Eysenck & S. B. G. Eysenck, 1964, 1968).

The EPI was still a two-factor inventory, so consequently Hans Eysenck and Sybil Eysenck (1975) published a third personality test, namely the Eysenck Personality Questionnaire (EPQ), which included a psychoticism (P) scale. The EPQ, which has both an adult version and a junior version, is a revision of the still-published EPI. Subsequent criticisms of the P scale led to yet another revision, the Eysenck Personality Questionnaire-Revised (H. J. Eysenck & S. B. G. Eysenck, 1993).

VI. Biological Bases of Personality

Eysenck believed that the personality factors P, E, and N all have powerful biological determinants. He cited as evidence the existence of these three biological components in a wide variety of cultures and languages.

VII. Personality as a Predictor

Eysenck's complex model of personality suggests that the psychometric traits of P, E, and N can combine with one another and with genetic determinants, biological intermediates, and experimental studies to predict a variety of social behaviors, including those that contribute to disease.

A. Personality and Behavior

According to Eysenck, an effective theory of personality should predict both proximal and distal consequences, and he and his son Michael (H. J. Eysenck & M. W. Eysenck, 1985) cited studies that demonstrated extraverts' greater demand for change and novelty in both laboratory studies and studies of social behavior.

Eysenck (1995) also hypothesized that psychoticism (P) is related to genius and creativity. Again, the relationship is not simple. Many children have creative ability, are nonconforming, and have unorthodox ideas, but they grow up to be noncreative people. Eysenck found evidence that these people lack the persistence of high P scorers.

B. Personality and Disease

Can personality factors predict mortality from cancer and cardiovascular disease (CVD)? Beginning during the early 1960s, Eysenck devoted much attention to this question. He teamed with Ronald Grossarth-Maticek to study the connection between personality characteristics and both cancer and cardiovascular disease. According to this research, people with a helpless/hopeless attitude are more likely to die from cancer, whereas people who react to their illness with anger and emotional arousal are much more likely to die from cardiovascular disease.

VIII. Related Research

The three-factor theory of Eysenck has drawn a considerable amount of research, and it is very popular in the field of personality. Eysenck developed the Eysenck Personality Questionnaire (EPQ) and its offshoots (Eysenck, 1959; Eysenck & Eysenck, 1964, 1968, 1975, 1993).

A. The Biological Basis of Extraversion

One of the major thrusts of Eysenck's theory is that personality dimensions are not arbitrary creations of culture but, rather, result from the basic genetic and neurophysiological makeup of the human species. If this assumption is valid, then neurophysiological differences should exist between people high on one end of a dimension (e.g., introversion) and those high on the other end of that dimension (e.g., extraverts). Second, the basic personality dimensions should be universal and not limited to a given culture.

Over the past 30 years, a substantial amount of research has explored cognitive, behavioral, and physiological measures of reactivity in relation to extraversion–introversion (Beauducel, Brocke, & Leue, 2006; Küssner, deGroot, Hofman, & Hillen, 2016; Mitchell & Kumari, 2016; Stelmack, 1990, 1997). For instance, in a recent study, Beauducel and colleagues (2006) predicted that extraverts would be less cortically aroused and show worse performance on a boring and monotonous task. Another of Eysenck's hypotheses that has generated some research is his optimal level of arousal. Eysenck theorized that introverts should work best in environments of relatively low sensory stimulation, whereas extraverts should perform best under conditions of relatively high sensory stimulation (Dornic & Ekehammer, 1990). A test conducted by Dobbs and colleagues (2011) predicted that extraverts would perform better than introverts on the noise and music conditions but not on the silence condition.

B. The Biological Basis of Neuroticism

Eysenck (1967) postulated that neuroticism resulted from increased activity or responsiveness and lower activation thresholds in the limbic system. This pattern is the same as introversion, but the location is different: Introversion involves increased activity and lower thresholds for cortical and reticular arousal rather than limbic system arousal.

Mincic (2015) conducted a meta-analysis on the topic of neuroticism and the structure and function of the amygdala and found an increased amygdala activity in the left than the right amygdala. Other research suggests that there are reduced neural connections between the amygdala and other brain regions involved in controlling thoughts. This lack of connection appears to inhibit the “off switch” in the amygdala, resulting in its overactivity to negative experiences (Canli, 2008; Ormel et al., 2012). In short, people high in neuroticism are biased toward and more sensitive to negative emotional experiences partly due to an overactive amygdala. Increased physiological reactivity—as seen in sweating—is also associated with neuroticism.

There is more research to be done and not all of the past research confirms each aspect of Eysenck's theory. But overall, a biological basis of neuroticism seems to be established.

IX. Critique of Eysenck's Biologically Based Theory

The factor theories of Eysenck and others rate high on parsimony, on their ability to generate

research, and on their usefulness in organizing data; they are about average on falsifiability and internal consistency. Also, the theories are rated low on the usefulness to the practitioner.

X. Concept of Humanity

On the *determinism versus free choice* dimension, Eysenck's theory sides somewhat toward the deterministic view, but only slightly. Regarding *optimism versus pessimism*, Eysenck is mostly silent, but on teleology versus causality he comes down on the side of causality.

On the question of *conscious versus unconscious determinants* of behavior, Eysenck's approach leans toward unconscious determinants insofar as people are mostly incapable of being aware of how genetics and brain processes affect their behavior and personality. Regarding the issue of *biological versus social influences*, it may be somewhat surprising to say, but in fact, Eysenck very much argued for "both-and"—both nature and nurture.

On the dimension of *individual differences versus similarities*, biological theory leans quite a bit toward individual differences. Biological, brain, and genetic differences focus on the uniqueness of individuals.