

BIOLOGICAL AND SOCIAL DETERMINANTS OF PERSONALITY: “NATURE *VERSUS* NURTURE” IN THE FIVE-FACTOR MODEL OF PERSONALITY

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This review article presents the solution to the issues of heritability and the environment in different theoretical approaches to the five-factor model of personality (lexical, questionnaire—NEO model, evolutionary, socioanalytic and dyadic-interactional). While the authors of the five-factor model of personality and of the NEO model McCrae and Costa are convinced of the biological basis of personality characteristics and their independence of environmental influences, the evolutionary and socioanalytic approaches take into account the interaction of biological and social determinants in creating personality characteristics. Although supporters of the five-factor model of personality agree that the personality is best characterized by Neuroticism (Emotional Stability), Extraversion, Openness to Experience (Intellect), Agreeableness and Conscientiousness, their opinions differ in whether personality characteristics are created independently of environmental effects or in the interaction between the environment and innate factors.

Five-factor model of personality description

The psychology of personality studies how many and which attributes best characterize personality. A large group of researchers have recently agreed on the fact that personality is best represented by five factors (dimensions) of personality. They are known as the Big Five factors and consist of the following characteristics: Neuroticism (Emotional Stability) defining the level of resistance to psychological distress and expressing the tendency to experience fears, uncertainty, anxiety on the one side of this dimension and mental stability, self-possession, and Emotional Stability on the other; Extraversion—connected with an interest in people, in the outer world, activity and energy, in contrast to introversion which means an orientation toward the world inside of the self and a preference for solitude; Openness to Experience (Intellect) including fertile imagination, sensitivity to art, experiencing new things, intellectual curiosity and tolerance towards different opinions on one side of the dimension, or a realistic view of the world, a lack of interest in art, a tendency towards dogmatism and conservative attitudes on the other side; characteristics of Agreeableness including relations to the others on a

continuum from compassion and cooperation to rejection, competition and manifestations of enmity; Conscientiousness including on the one side of this dimension responsibility, effectiveness, a sense of purpose, on the opposite side there is little effort taken in fulfilling duties, an unsystematic approach, and irresponsibility.

The five-factor model of personality was identified for the first time on the basis of the analysis of the personality-relevant words in English and later also in other languages including Czech (Hřebíčková 1997). Lexical approaches to personality are based on the assumption that all significant individual differences, by which people are distinguished one from another, are embodied in language. The first stage of these researches is the compilation of as complete a list of personality-relevant terms as possible included in a dictionary (in codified form) of the particular language. The aim of the second stage is to distinguish dispositions or traits (relatively stable characteristics of personality) from other characteristics used, for example, for the description of temporary mental states, physical symptoms, attitudes or appearances. In the third stage, a list of traits is given to subjects for self-rating. Using factor analysis, traits are usually grouped into five factors, which can be interpreted with small distinctions across different languages and cultures (for details, see Hřebíčková 2003).

We can look at the five-factor model of personality from various theoretical perspectives. Their advocates have different views on what the personality characteristics (traits, attributes, dispositions) incorporated in the five-factor model actually express: whether they are innate, acquired, or whether interactions of genetic effects and environmental influences are applied in their constitution. The goal of this contribution is to characterize individual theoretical approaches towards the five-factor model of personality: lexical, questionnaire (NEO model), evolutionary, socioanalytic, and dyadic interactional and to indicate how the issue of genetic and environmental influences on the constitution of the five general personality traits is solved from these different theoretical perspectives.

The lexical approach to the five-factor structure of the description of personality

The aim of the lexical research of the five-factor model of personality is to organize personality-relevant words and to find the most important of them. Their ambition is not to create a theory of personality. Some of them even stress that factors inferred from lexical analyses express only characteristics of the description of personality (Ostendorf 1989). Within this approach, lexical researches are going on in particular languages aimed at verifying the validity of the five-factor personality structure in other than Indo-European languages and quantitative and qualitative comparison of the national versions of the five-factor structure is carried out (Hřebíčková 2003; DeRaad 2000; Peabody, DeRaad 2002); lexically oriented explorers try to interconnect the dimensional model of traits with a circumplex structure (Hofstee, DeRaad, Goldberg 1992). In my opinion, the fact whether the

characteristics of personality are innate or acquired is not centre of their attention. What is important to lexically-oriented psychologists of personality is how to describe a personality without efforts to explain it.

Questionnaire (dispositional) approach to the five-factor model of personality

The situation is different with the supporters of the questionnaire (dispositional) approach to the five-factor model of personality represented by NEO model of Costa and Mc Crae. In the 1970s, they began developing the method—personality inventory, which they intended to use in a Baltimore longitudinal study. At first, they conducted the analysis of the then best-known Cattell personality questionnaire (16 PF); they obtained three groups of scales and named them Neuroticism, Extraversion, and Openness to Experience. After getting acquainted with Goldberg's lexical research that repeatedly confirmed the five-factor structure of the personality description, they expanded their three-dimensional model by two additional dimensions taken from lexical researches—Agreeableness and Conscientiousness—and began developing NEO inventories for measuring these dimensions (for details on the history of NEO inventories, see Hřebíčková 2002). They verified connections of dimensions measured by NEO inventories with other personality questionnaires and inventories, compared five dimensions of personality with other psychological constructs, found out identical developmental trends in longitudinal and cross-sectional studies, compared the results from different national versions of NEO inventories and proved self-other agreements. Their almost thirty years of research resulted in the formulation of a five-factor theory (FFT) of personality (McCrae and Costa 1996, 1999) related to McAdams's three-level personality system (McAdams 1996). The first level includes personality traits, the second level contains the coping strategies, skills, and values and the third level includes life narratives that give unity and purpose to the self. The five-factor theory distinguishes between biologically based *basic tendencies* (level 1 in McAdams) and 'culturally conditioned *characteristic adaptation* (containing the important subcategory of self-concepts; McAdams's level 2). Fig. 1 shows a model of the personality system according to five-factor theory (for details on FFT, see Hřebíčková 2000).

The readers will probably be surprised by the absence of an arrow from external influences to basic tendencies in Fig. 1. The five-factor theory presumes that personality traits are endogenous dispositions not influenced by the environment and McCrae and Costa understand them identically as temperament characteristics. These authors do not deny environmental influences in the functioning of the personality system but they point out that the environment has a direct influence only on the characteristic adaptations and since the traits are manifested through them, the relation of the environment to personality traits is in fact mediated. The manifestation of traits is then exposed to the influence of culture in which the individual lives. Anxious Americans are afraid of computer viruses, terrorists, and the SARS epidemic; anxious Navahos are worried about ghosts and witches. The biologically-

given basic tendency is manifested through the characteristics of adaptation, which are affected by culture.

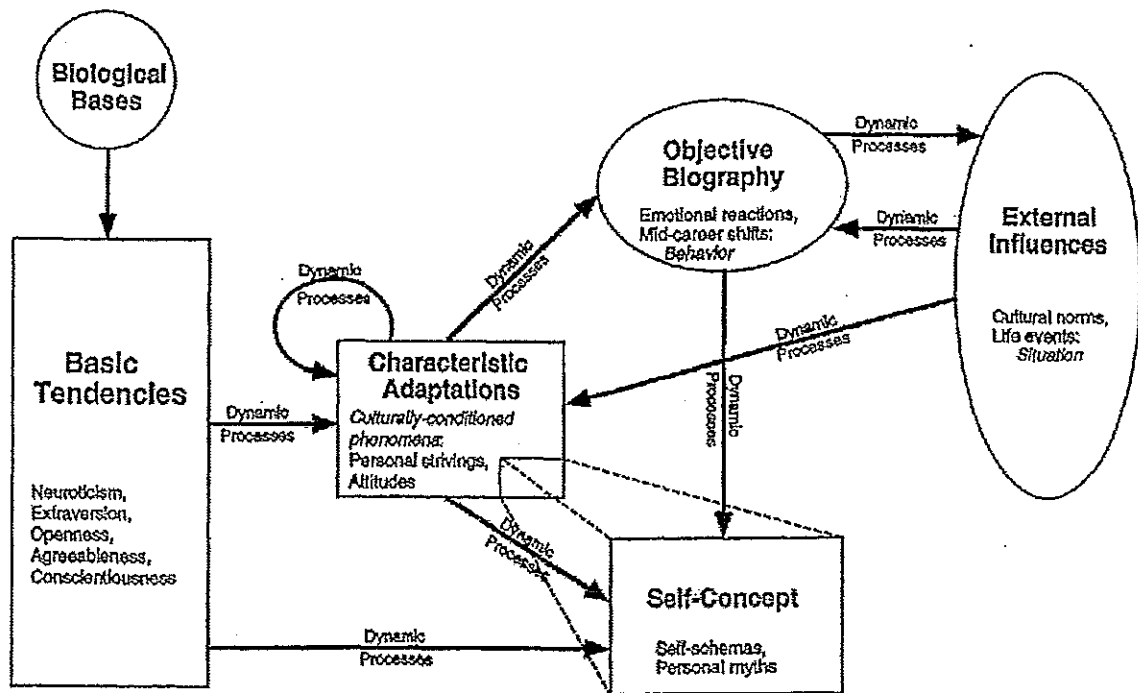


Fig. 1. Personality system according to five-factor theory (adapted from McCrae and Costa 1996).

The authors of the theory based their conviction that personality characteristics included in the five-factor model as well as the temperament characteristics are biologically conditioned mental tendencies not influenced by the environment on the studies of behaviour genetics, studies dealing with the influence of parents on their children, researches into the structure of personality in different languages, zoopsychological explorations, results from longitudinal and cross-sectional studies indicating the stability of individual differences and recurring findings of identical developmental trends in different cultures.

Heritability of personality characteristics. The studies of behaviour genetics consist of research on twins or adopted children. According to McCrae et al. (2000) empirical proof that personality traits have a substantial genetic component and little or no component that can be attributed to environmental influences predominate (Jang et al. 1998). Although behaviour-genetic studies admitting environmental effects on personality traits are also available, it is not the reason for the authors of FFT to modify their personality system.

Studies of the influence of parents on child's personality. In their longitudinal study, Kagan and Moss (1962, according to McCrae et al. 2000) examined mothers and their children during the period from the birth to age 10 and studied the child's

personality at ages 19–29. Of 552 relevant correlations, only 35 (6%) were statistically significant. Their results show that parents have a minimum influence on the child's personality. These findings are consistent with the results of adoption studies. These researches show that the parenting practices do not seem to have much influence on the child's personality.

The five-factor structure of personality in different languages and cultures. Another argument confirming the assumption of the biologically based traits is according to McCrae and Costa the recurring discovery of the five-factor structure of personality in different languages and cultures. They based their argument on the comparison of the factor structure of NEO inventories in different languages; the structure indeed agrees with the original American one (Hřebíčková, Urbánek, Čermák 2002). If we translate the method from one language into another, there is a high probability that the structure established in one language will also be replicated in another language. Lexical studies in particular languages do not confirm, however, such optimistic conclusions. The existence of all dimensions of the five-factor structure was not proved in all languages. There are languages where the seven-factor structure was found and therefore the argument of the existence of the national versions of the five-factor structure seems to be more realistic (DeRaad 2000, Hřebíčková 2003).

Zoopsychological researches. Some characteristics included in the five-factor model were also found out in animals. This confirms the universality of the linguistic means used for understanding the outer world and supports the assumption of the authors of FFT that personality characteristics are exclusively biologically conditioned. Gosling and Bonnenberg (1998) asked breeders to assess their dogs and cats and identify three factors corresponding with Neuroticism, Extraversion, and Agreeableness and the fourth factor combining characteristics of Openness and Conscientiousness, a sort of animal intellect. King and Figuero (1997) analysed the evaluation of chimpanzees bred in captivity and identified six factors; five of them correspond to the FFM and the robust factor of Dominance. In the Czech Republic, the personality ratings in the description of primates has been conducted by Konečná (2000). She prepared a project for rating the characteristics of the FFM in primates in natural conditions during an expedition to India (Konečná 2003, personal communication); the results have not been published to date.

Stability of personality. Costa and McCrae think that personality is stable after the age of thirty. Their arguments are based on longitudinal studies and a series of cross-sectional explorations of the five general dimensions of personality studied using NEO inventories in American subjects (Costa, McCrae 1997); McCrae, Costa, 1990). NEO inventories were translated into more than 30 languages and the assumption about the stability of personality after thirty years of age was verified in different cultures. The cross-sectional data from Chinese subjects (Yang, McCrae, Costa 1998) and the data from other cultures (McCrae et al. 1999; McCrae et al. 2000) show, however, that the changes of personality characteristics occur also in older subjects. The longitudinal research using the California Psychological Inventory for identifying personality traits does not confirm the assumption that personality changes culminate at the age of thirty and then they do not change any more (Helson, Jones, Kwan 2002). Caspi and Roberts (2001) do not agree with the

arguments about the stability of personality after the age of 30 either. In their opinion, the continuity of personality is ambiguous, rather lower in childhood and early adulthood, the development of personality traits does not end at a particular age in adulthood but continues to develop and change until old age.

Developmental trends in five general dimensions of personality in different languages and cultures. The studies using NEO inventories in different cultures and the California Psychological Inventory (traits measured by this method correspond with the five personality dimensions) for identifying personality characteristics confirm, however, identical developmental trends of the five general personality dimensions in different cultures: the level of Neuroticism, Extraversion and Openness to Experience decreases and Agreeableness and Conscientiousness increases with age.

The developmental trends indicated were primarily confirmed on the basis of the self-rating of the respondents of different ages. In two studies, five general personality dimensions in respondents of different ages were assessed by their relatives, friends or acquaintances (peer rating). In American subjects, developmental trends similar to those based on self-rating were confirmed (Piedmont 1994). But in the German sample of 2000 twins, where each twin was rated by two persons, Conscientiousness was found to increase with age, but there were no statistically significant age effects for Extraversion and Openness to Experience and correlations of Neuroticism and Agreeableness were very low (Rieman et al. 1997). Developmental trends of five general personality dimensions based on the self- and peer-rating using the NEO personality inventory were also studied in Czech and Russian respondents (McCrae et al., in press). The analyses of self-rating from both countries confirm the developmental trends found earlier—Neuroticism, Extraversion, and Openness to Experience decline and Agreeableness and Conscientiousness increase with age. In the Russian sample a decrease in the level of Extraversion and Openness and an increase in Agreeableness and Conscientiousness with age were confirmed by peer rating; in Czech subjects, the identical trend was confirmed by peer rating only for Extraversion and Openness.

Three possible interpretations can be offered for explaining the developmental trends of the five general personality dimensions based on self-reports in different cultures (McCrae et al., in press). The changes of personality characteristics with age can reflect the influence of the environment or historical changes across all cultures, for example the increasing influence of the media. They can be associated with the identical social demands that people face in each culture (e.g. the adults should be dependable and caring parents). These changes express the biologically based processes conditioned by intrinsic maturation. The findings of the identical developmental trends in respondents coming from the countries with different histories, development, religion, culture, and language (e.g. the Czech Republic and Turkey, cf. McCrae et al. 2000) are very important for the authors of the five-factor theory that confirm their assumptions. It is the intrinsic maturation supposed to be universal for humans and not the cultural influences or the environment, in which an individual lives that explains the developmental trends recorded.

An evolutionary approach to the five-factor model

David M. Buss (1996, 1997) is a supporter of the evolutionary approach to the five-factor model based on Darwin's theory of natural selection. Evolution operates through a differential reproductive success. From the evolutionary perspective, it is therefore necessary to understand personality in connection with the problems, which had been solved by thousands of human generations. Adaptive problems connected with survival and reproduction belong to the most important. From this perspective, personality consists of psychological mechanisms and behavioural strategies created by people to solve these problems. Successful reproduction includes the selecting and attracting of a suitable mate, copulation, getting rid of the potential rivals, child rearing. Personality characteristics, such as dominance, sociability, and emotional stability are closely allied with the selecting of partners and reproduction. The fact that people live in socially hierarchized groups brings, however, also tasks associated with social adaptation. Others can support us in solving adaptive problems or they can hinder solving such problems. Friends, partners and people who like us, help us realize the strategies which enable us to assert ourselves; humans, who compete with us, will not support us; by contrast, they will try to hamper our goals. Buss calls these phenomena strategic support (facilitation) and strategic interference.

According to Buss, individual differences included in the five-factor model are applied in solving adaptive problems. The individuals with a high level of Extraversion will be able to apply a socially dominant solution to adaptive problems, individuals with a high level of Agreeableness will prefer cooperation with others, individuals with a high level of Conscientiousness will use their discipline, industry, perseverance, the emotionally stable individuals will make use of their consistency, inner calmness, ability to cope with the obstacles, the individuals with a high level of curiosity will be able to apply creative solutions to adaptation problems. From the evolutionary perspective, developmental trends of the five dimensions of personality can be explained so that the higher level of Extraversion and Openness to Experience in younger people is an indispensable prerequisite for finding a mate, whereas higher allure Conscientiousness and Agreeableness in older persons are important for raising a family and child rearing.

The evolutionary approach assumes that the characteristics of the five-factor model were created and applied in the process of the adjustment of an individual to the environment and contributed to its successful reproduction and to solving adaptive problems (facilitation and interference). The genetically based individual differences, such as the type of physical constitution, physical attractiveness determine to some extent the adaptation problems an individual will have to cope with and the most successful strategic solution (masculine mesomorphic people will be more successful in applying aggressive strategies than ectomorphic persons). The genetically given differences represent different adaptation problems in different individuals. According to Buss, heredity and the environment participate in the successful solving adaptive problems.

Socioanalytic perspective on the five-factor model

The socioanalytic perspective of the interpretation of the five dimensions of personality presented by Robert Hogan (Hogan 1996; Hogan, Smither 2001) is in agreement with the evolutionary interpretation (human nature is a product of evolutionary adjustment), social interactions (realized through an exchange of the status and acceptance) and psychoanalysis (psychological mechanisms are influenced by a "small amount of unconscious biological needs").

The socioanalytic theory differentiates between the personality from the perspective of an observer and personality from the viewpoint of the actor. The personality from the perspective of the observer consists of the typical characteristics of the behaviour of another person and reflects his/her reputation. Traits or attributes expressing reputation are evaluated because reputation reflects the measure of status and acceptance. Hogan regards the five-factor theory of McCrae and Costa as reductionist and limited to biological and physiological mechanisms. From the perspective of the socioanalytic theory, traits are terms used by observers to describe actors. Traits are linguistic tools of observers. They are cognitive categories used by the observer to decode different qualities of the actor's behaviour. Reputations are encoded in traits; they are stable and on the basis of them future behaviour can be predicted; attention of the others is focused on reputation and this is why people care deeply about them.

Hogan uses the following example for demonstrating the differences in a common and socioanalytic understanding of traits. According to the classical theory of traits, shy people are genetically predisposed to social discomfort, they hesitate to communicate with other people and they feel unpleasant in new situations. The socioanalytic perspective offers another explanation. Shyness and hesitation to communicate with other people can be (probably unconsciously) an interpersonal strategy. Based on knowledge of our evolutionary history we can assume that it was dangerous to talk to strangers and it usually led to psychological distress. In a human community, such distress is a price to pay for entering the social interaction. Some people are basically not willing to pay such a price for joining in the interaction and they thus apologize for their shyness. If somebody is known as a shy person, s/he can avoid many unpleasant situations in social life (can avoid to talk with dull people at receptions). Shy people leave the burden of communication to other people and control the interaction, whereas the others try to persuade them to have a chat. Being shy has many advantages and these advantages can outweigh the disadvantages.

The most important characteristics of reputation have a clearly defined structure and Hogan is convinced that the structure is realized in the five-factor model of personality and reminds us that this model was also identified on the basis of peer ratings. People are animals living in a group, each person is motivated by obtaining status and social acceptance and the sources come from other people—the exchange takes place during interaction. Reputation defined within the framework of the five-factor model is an indicator of how a person is doing in his/her life and is associated with success in reproduction. Every individual in a group has the potential to contribute to the success of this group or to impede it. Within this context, the reputation encoded in the five-factor model can foretell the usefulness of every

individual for the group. From the socioanalytic perspective, the five-factor model resembles Jung's archetypes, individual characteristics are innate categories of human perception used for evaluating the potential contribution to the success of the family, tribe, community. Hogan, however, does not either validate this argument empirically or develops it further. The characteristics of the five-factor model belong, according to him, to observers who use them for evaluating and predicting the behaviour of other people. The assessment within dimensions of the five-factor model describes the position of the actor within a social community. From the socioanalytic perspective, traits have their biological and social origin.

The dyadic interactional approach to the five-factor model

The history of interpersonal traditions in the psychology of personality and its diagnosis is different from the five-factor model of personality; they developed independently. In recent years, however, they have complemented each other. One of the theoretical approaches to the five-factor model can therefore be named dyad interactive (Wiggins, Trapnell 1997). It is based on the interpersonal theory of H. S. Sullivan: its basic thesis is that we can look at personality only through social interaction. The interpersonal theory inspired Leary to compile a taxonomy of interpersonal behaviour and to work out the Interpersonal Diagnosis of Personality. The interpersonal approach was further worked out by J. Wiggins: he understands the interpersonal behaviour as a dyad interaction with clearly defined social and emotional consequences for participants. He also designed an instrument for diagnosing the interpersonal behaviour—The Interpersonal Adjective Scale (for details, see VÝrost 2000). Costa and McCrae verified empirically that the interpersonal circle represented by Wiggins's IAS includes the factors of Extraversion and Agreeableness of the five-factor model. These two approaches to personality led to the expansion of IAS by a diagnosing of additional dimensions of the five-factor model and a construction of IAS-B5 (Wiggins, Trobst 2002).

The interpersonal transaction is realized by the exchange of love and status and therefore the basic personality dimensions follow from the distinction between the two forms of exchange. Dominance defines exchanges based on status and Agreeableness exchanges based on love. From this position, traits are formed and realized in a dyad interaction; social interaction, that is environmental effects, being there crucial.

Evolutionary and socioanalytic approaches to personality and the five-factor model have the same theoretical starting points. In both cases it is presumed that personality can be best understood within the context of human evolution. Both approaches underline adaptation and the life of an individual within a group bringing the "evolutionary environment" to which an individual adjusts. Interpersonal interaction is also crucial in the dyadic interactional understanding of traits. However, there are also differences between these approaches. Hogan assumes that psychological mechanisms are affected by "a small number of unconscious biological needs". On the other hand, Buss thinks that there are a number of

psychological mechanisms because there is also a large amount of adaptive problems that people solve. In their theory, Costa and McCrae speak also about the personality-relevant individual differences of adaptation: individual differences participate in solving the problems of adaptation; this is in agreement with the evolutionary approach. But they differ completely in understanding the origin of traits to which they attribute an exclusively biological basis in contrast to the evolutionary and socioanalytic approaches that take into account the interaction of the interaction of biological, genetically based approach with environmental effects.

In this article I tried to outline how the issues of heritability and the environment are solved in different theoretical approaches to the five-factor model of personality. My aim was to point out that the positions and perspectives of the supporters of the five-factor model of personality on the fact whether personality traits develop independently of environmental influences or by interaction between the environment and innate factors are varied. This topic has come to the fore again recently, not only in biology and genetics but also in the psychology of personality (Rowe 1997). Its better understanding would probably be achieved by the study of other sources as well as a comparison of the studies of behaviour genetics and the ensuing models of Loehlin (1992) or Plomin (1990) with the environmentalistic position of Scarr (1993) (according to Rowe 1997) or an entirely different perspective on personality as part of culture (Hofstede 1980, Triandis 1997).

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