

A

PSYCHOBIOLOGICAL MODEL OF TEMPERAMENT AND CHARACTER: TCI

My heart leaps up when I behold

*A rainbow in the sky:
So was it when my life began;*

*So is it now I am a man:
So be it when I shall grow old,*

*Or let me die!
The Child is the Father of the man;*

And I could wish my days to be

Bound each to each by natural piety.

-William Wordsworth

THEORETICAL DEVELOPMENT OF THE TCI

The Model of Temperament

Cloninger began work on the structure of personality to develop a general model to explain the differences between patients with somatization disorder and generalized anxiety disorder (Cloninger 1986). He observed that patients with somatic anxiety had impulsive aggressive personality traits, whereas those with generalized cognitive anxiety had obsessive compulsive personality traits. Hysterics and others with somatic anxiety had been described by Eysenck as neurotics extraverts, whereas neurotics with cognitive anxiety had been described as neurotic introverts using the Eysenck Personality Questionnaire (Eysenck and Eysenck 1976).

Cloninger sought a general model that may be applied to both normal and abnormal personality like the model of Eysenck, but concluded that Eysenck's model was unacceptable. The dimensions of Neuroticism

and Extraversion had been specified on the basis of factor analyses of the phenotypic (observed) structure of personality. Phenotypic variation is the product of interaction of both genetic and environmental factors, and Eysenck assumed that the phenotypic and genotypic structures were the same. However, this assumpti-

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CLONINGER'IN PSIKOBIOLOJİK MIZAÇ (HUY) VE KARATER KURAMI: TCI

ÖZET

Cloninger kişiliğin iki temel bileşeni olan mizaç ve karakterdeki normal ve anormal varyasyonları açıklayan boyutsal bir psikobiolojik kişilik modeli geliştirmiştir. Cloninger, mizacın temelini ve karakterin gelişmesini açıklayarak, kişiliğin ikisi arasındaki etkileşimin son ürünü olduğunu öne sürdü. Mizaç ve Karakter Envanteri (TCI) kişiliğin yedi temel boyutunu ölçmeye yarayan bir kendini değerlendirme ölçeğidir. TCI önceden geliştirilmiş kişilik modellerini kuramsal ve ampirik açıdan desteklerken, klinik kullanımdaki bazı sınırlılıkları ortadan kaldırmıştır. Cloninger'in kişilik kuramı kişiliğin genetik temelinden, davranışın nörobiyolojik temellerine, kişiliğin bilişsel ve emosyonel yapısı ve gelişiminden, kişilik boyutlarında bireysel farklılıkların davranışsal bağlarına, kişilik yapılarının gelişimsel etmenlerle etkileşiminden, psikiyatrik bozukluklara yol açmasına uzanan çok sayıda alanda kapsamlı bilgi sağlama potansiyeline sahiptir. Gelişmekte olan beyin görüntüleme yöntemlerinin katkısıyla, Cloninger'in kişilik kuramı kişiliğin beyindeki bağlantılarını açıklığa kavuşturarak, normal ve patolojik durumların daha iyi anlaşılmasına katkıda bulunacaktır. Bu yazıda Cloninger'in kişilik modeli ve TCI'nin kuramsal altyapısı ampirik bulgular ışığında sunulmuş, genel toplumda ve psikiyatrik hastalarda potansiyel klinik kullanımı tartışılmıştır.

Keywords: kişilik, mizaç, karakter, TCI

A PSYCHOBIOLOGICAL MODEL OF TEMPERAMENT AND CHARACTER: TCI

ABSTRACT

Cloninger developed a dimensional psychobiological model of personality that accounts for both normal and abnormal variation in two major components of personality, temperament and character. The Temperament and Character Inventory (TCI) is a self-administered dimensional questionnaire constructed to assess the seven basic dimensions of personality. TCI maintains the strong theoretical and empirical support of previously developed psychobiological models while overcoming some of their limitations for clinical use. Cloninger's model of personality has a tremendous potential to provide comprehensive insight into human personality at multiple levels of analysis, including including the genetics of personality, neurobiological foundations of behavior, the cognitive emotional structure and development of personality, the behavioral correlates of individual differences in personality dimensions, and the interactions of personality constellations with developmental factors in relation to the vulnerability to psychiatric disorders. Within emerging neuroimaging technology, Cloninger's model of personality will provide novel opportunities for elucidating the characterization of neural correlates of personality, and enable a better understanding of normal and pathological states. In this article, both underlying theory and empirically validated findings along with its potential use in in both general population and psychiatric patient population were reviewed.

Keywords: personality, temperament, character, TCI

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on was questionable. In particular, it was already known that extraversion is genetically heterogeneous (Eaves and Eysenck 1975). It is composed of two factors that are largely genetically independent—impulsivity and sociability—and appears to be a single behavioral dimension because of shared environmental influences. In other words, genetic and environmental influences do not influence behavior in the same way, which is contrary to Eysenck's assumption. Besides, Gray (1982) had shown that anti-anxiety drugs affected both neuroticism (decreases) and extraversion (increases), suggesting that anxiety was more parsimoniously defined by a single dimension combining the two, that is, by a dimension corresponding to neurotic introvert. Likewise "impulsivity" was defined as a dimension independent of anxiety, that is, by neurotic extraverts. In addition, he showed that the rate of operant learning in response to signals of punishment was maximal along the "anxiety" or compulsivity dimension, not Eysenck's neuroticism factor.

Two dimensions were too few to provide a comprehensive model of personality. Eysenck's psychoticism dimension was genetically heterogeneous and was an unsatisfactory scale to measure a third dimension of heritable personality traits (Heath et al. 1994). Other models derived by factor analysis of behavioral phenotypes, such as the so-called Five Factor model, include neuroticism and extraversion factors; accordingly, they suffer the same inadequacies as the model of Eysenck. Fortunately, the Swedish psychiatrist Henrik Sjöbring had described a model of personality in terms of its underlying neurogenetic basis that provided clues to the content of a third dimension. Sjöbring (1973) called his three dimensions as solidity (vs impulsivity), validity (vs compulsivity), and stability (vs moody sociability). He modeled the description of the low variants of these three on impulsive hysterics, compulsive psychasthenics, and sociable depressives, respectively (Schalling 1978). Therefore, Sjöbring's description stability provided a tentative construct for a third heritable dimension of temperament. Because of the ambiguity of such descriptive adjectives, Cloninger next developed a neurobiologically based operant learning model to guide the rational development of descriptors for temperament (Cloninger 1987, 1991).

Cloninger initially hypothesized that the temperament systems in the brain were functionally organized as independently varying systems for the activation, maintenance, and inhibition of behavior in response to specific classes of stimuli. Behavioral activation involved the activation of behavior in response to novelty and signals of reward or relief of punishment; accordingly, individual differences in such activatability were called "Novelty Seeking". Behavioral inhibition occurred in response to signals of punishment or nonreward, so individual differences in inhibitability were called "Harm Avoidance". Behavior

that was previously rewarded was later maintained for a while without continued reinforcement, and an individual difference in such maintenance was called "Reward Dependence". Reward Dependence initially included the sociability and persistence described by Sjöbring as aspects of low stability. However, recent work has shown that dependence on warm social attachments and persistence despite intermittent reinforcement are usually dissociated and are independently inherited (Cloninger et al. 1993).

TPQ was developed to test these hypotheses and to evaluate their adequacy as a general model of personality. Each of the three major dimensions had four subscales, including Persistence as one subscale of Reward Dependence. Subsequent factor analysis supported the proposed factor structure with Persistence as a fourth dimension (Nixon & Parsons 1989, Cloninger et al. 1991).

In both normal and abnormal samples, the putative dimensions were highly reliable and stable despite mood state; only Harm Avoidance was transiently increased when individuals were agitated or depressed (Cloninger 1987, Cloninger et al. 1991, Brown et al. 1992, Svrakic et al. 1992, Perna et al. 1992, Joffe et al. 1993), and Novelty Seeking may be transiently increased when bipolar patients are subclinically hypomanic (Strakowski et al. 1993).

Most importantly, recent large scale twin studies have confirmed that the four dimensions of temperament, Novelty Seeking, Harm Avoidance, Reward Dependence (now limited to social sensitivity) and Persistence are genetically homogeneous and independent of one another (Heath et al. 1994, Stallings et al. 1996).

It is remarkable that the four factor model of temperament can, in retrospect, be seen as a modern interpretation of the ancient four temperaments: individuals differ in the degree to which they are melancholic (Harm Avoidance), choleric (Novelty Seeking), sanguine (Reward Dependence), and phlegmatic (Persistence). However, now the four temperaments are understood to be genetically independent dimensions that occur in all factorial combinations, rather than mutually exclusive categories. The four temperaments can also be seen to correspond to the four basic emotions of fear (Harm Avoidance), anger (Novelty Seeking), love (Reward Dependence), and tenacity (Persistence).

The Model of Character

The model of four temperaments provided an excellent description of traditional subtypes of personality disorder (Cloninger 1987), but proved unable to distinguish whether someone has a personality disorder (Cloninger et al. 1993). Fortunately, studies comparing the TPQ to other personality inventories help to identify additional aspects of personality that were not accounted for by its temperament dimensions. These included measures of mature Self-Directed be-

havior. Cooperativeness, and Self-Transcendence (Cloninger et al. 1993).

The characterologic aspects of personality involve individual differences in self-concepts about goals and values, in contrast to the temperaments that involve differences in automatic emotional reactions and habits. Such self-concepts modify the significance or meaning of what is experienced, hence also changing emotional reactions and habits. Such self-concepts modify the significance or meaning of what is experienced, thereby also changing emotional reactions. Accordingly, the three character dimensions involve both an intellectual perspective about self/nonself boundaries and an emotional perspective. Self-directedness is based on the concept of the self as an autonomous individual; from this self-concept are derived feelings of personal integrity, honor, self-esteem, effectiveness, leadership, and hope. Likewise, cooperativeness is based on the concept of self as an integral part of humanity or society; from this self-concept are derived feelings of community, compassion, conscience, and charity. Furthermore, self-transcendence is based on the concept of self as an integral part of the universe and its source; from this self-concept are derived feelings of mystical participation, religious faith, and unconditional equanimity and patience (Cloninger et al. 1993).

Individuals with the same temperament may behave differently as a result of character development. For example, an individual high in Novelty Seeking and low in Harm Avoidance may have an impulsive personality disorder if they are low in Self-Directedness and Cooperativeness, or they may be a mature and daring explorer, inquisitive scientist, or acquisitive businessman. Accordingly, a comprehensive questionnaire for measuring all seven dimensions of personality, called the Temperament and Character Inventory (TCI), was developed for clinical and research use (Cloninger et al. 1993).

BASIC DESCRIPTION OF THE PERSONALITY SCALES

The Temperament and Character Inventory (TCI) evaluates seven higher order temperament and three higher order character traits. Each of the seven temperament and character traits is multifaceted, consisting of several facets or lower order components. Twenty five facets altogether (12 facets of temperament and 13 facets of character) make up the TCI.

Harm Avoidance

Harm Avoidance (HA) is multifaceted, higher order temperament trait consisting of four aspects or lower order traits:

- Anticipatory Worry and Pessimism versus Uninhibited Optimism (HA1)
- Fear of Uncertainty (HA2)
- Shyness with Strangers (HA3)
- Fatigability and Asthenia versus Vigor (HA4)

Individuals high in HA tend to be cautious, careful, fearful, tense, apprehensive, nervous, timid, doubtful, discouraged, insecure, passive, negativistic, or pessimistic even in situations that do not normally worry other people. These individuals tend to be inhibited and shy in most social situations. Their energy level tends to be low and they feel chronically tired or easily fatigued. As a consequence they need more reassurance and encouragement than most people and are usually sensitive to criticism and punishment. The advantages of high Harm Avoidance are the greater care and caution in anticipating possible danger, which leads to careful planning when danger is possible. The disadvantages occur when danger is unlikely but still anticipated, such pessimism or inhibition leads to unnecessary worry.

In contrast, individuals with low scores on this temperament dimension tend to be carefree, relaxed, daring, courageous, composed, and optimistic even in situations that worry most people. These individuals are described as outgoing, bold, and confident in most social situations. Their energy level tends to be high, and they impress others as dynamic, lively, and vigorous persons. The advantages of low Harm Avoidance are confidence in the face of danger and uncertainty, leading to optimistic and energetic efforts with little or no distress. The disadvantages are related to unresponsiveness to danger, which can lead to reckless optimism (Cloninger 1987, Cloninger et al. 1994).

Harm Avoidance Facets

Anticipatory Worry and Pessimism vs Uninhibited Optimism (HA1)

High scorers on this subscale manifest two distinctive behavioral tendencies. First, these people are pessimistic worriers who tend to anticipate harm and failure. This tendency is especially pronounced in hazardous, unfamiliar, or realistically difficult situations. But, it also occurs during harmless situations, and even with reassurance and supportive circumstances. Second, these people have difficulties getting over humiliating and embarrassing experiences, rather they tend to ruminate about these experiences for long periods of time.

In contrast, individuals who score low on the Worry and Pessimism subscale are described as positive-thinking optimists. These persons typically do not worry in facing the difficulties. They tend to be uninhibited, indifferent, and carefree, with minimal reluctance to jeopardize even their physical well being. When embarrassed and humiliated, these people tend to overcome it very quickly (Cloninger 1987, Cloninger et al. 1994).

Fear of Uncertainty (HA2)

Individuals who score high on this subscale cannot tolerate uncertainty or unfamiliar circumstances that are potentially dangerous. They often feel tense

and anxious in unfamiliar or uncertain situations, even when there is little to worry about. Consequently, they rarely take any risks, have difficulty adapting to changes in routine, and prefer to stay quiet and inactive.

In contrast, low scorers on the Fear of Uncertainty subscale tend to be confident, calm, and secure in almost all situations, even situations most people find unfavorable or hazardous. Hence, these individuals prefer to take risks, such as driving an automobile fast on an icy road, rather than having to stay quiet and inactive for a few hours. These people tend to adapt to changes in routine easily (Cloninger 1987, Cloninger et al. 1994).

Shyness vs Strangers (HA3)

Individuals who score high on this subscale are described as unassertive and shy in most social situations. They often actively avoid meeting strangers because they lack confidence with people they don't know very well. They are usually unwilling to enter into relationships with people they don't know unless given a strong guarantee of acceptance. In general, any initiative they may have is easily inhibited by unfamiliar people or situations.

In contrast, low scorers on the Shyness subscale are described as daring, forward, and outgoing. They tend to speak without hesitation and readily engage in social activities. They are not shy with strangers at all. Their initiative is almost never inhibited by unfamiliar people or situations (Cloninger 1987, Cloninger et al. 1994).

Fatigability vs Vigor (HA4)

Individuals who score high on this subscale appear to be asthenic and to have less energy than most people. They often need naps or extra rest periods because they get very easily tired. These people typically recover more slowly than most people from minor illnesses or stress.

Individuals who score low on the Fatigability subscale tend to be highly energetic and dynamic. They can usually stay "on the go" for long periods or having to "push" themselves. In other words, only few things influence these people as difficult or tiring. They typically recover more quickly than most people from minor illnesses or stress (Cloninger 1987, Cloninger et al. 1994).

Novelty Seeking

Novelty Seeking is a multifaceted higher order temperament trait consisting of the following four aspects of lower order traits:

- Exploratory Excitability vs Stoic Rigidity (NS1)
- Impulsiveness vs Reflection (NS2)
- Extravagance vs Reserve (NS3)
- Disorderliness vs Regimentation (NS4)

Individuals high in Novelty Seeking tend to be quick-tempered, excitable, exploratory, curious, enthusiastic, ardent, easily bored, impulsive, and disorderly.

The advantages of high Novelty Seeking are enthusiastic and quick engagement with whatever is new and unfamiliar, which leads to exploration of potential rewards. The disadvantages are related to excessive anger and quick disengagement whenever their wishes are frustrated, which leads to inconsistencies in relationships and instability in efforts.

In contrast, individuals low in Novelty Seeking are described as slow tempered, indifferent, uninquisitive, unenthusiastic, unemotional, reflective, thrifty, reserved, tolerant of monotony, systematic, and orderly (Cloninger 1987).

Novelty Seeking Facets

Exploratory Excitability vs Stoic Rigidity (NS1)

Individuals who score high on the Exploratory Excitability subscale enjoy exploring unfamiliar places and situations even if most people think it is a waste of time. They get excited about new ideas and activities easily, for they tend to seek thrills, excitement, and adventures. They are easily bored and hence avoid monotony. These people are typically intolerant of routine and try to introduce a change. Hence, they are sometimes described as unconventional or innovative.

In contrast, individuals who score low on the Exploratory Excitability subscale have little or no need for novel stimulation. They do not derive special satisfaction from exploration and consequently are contented with or prefer familiar places, people, and situations. They are resistant or slow to engage in new ideas and activities. These people are rarely bored and thus tend to stick with familiar "tried and true" routines even if there are new and better ways to do the same thing (Cloninger 1987, Cloninger et al. 1994).

Impulsiveness vs Reflection

Individuals who score high on the Impulsiveness subscale tend to be excitable, dramatic, impressionistic, and moody individuals who make decisions quickly on incomplete information and control their impulses poorly. Typically, these persons act on their momentary instincts and instinctive premonitions. Hence, they have to revise their decisions and opinions frequently when unanticipated events or information develop. They are often distractable and have short spans of attention.

In contrast, individuals who score low on the Impulsiveness subscale are described as reflective. They rarely act on guesses or hunches. Rather, they tend to be analytical and require detailed information when making a decision or forming an opinion. These individuals rarely break rules. They are not easily distracted and can stay focused for long periods of time (Cloninger 1987, Cloninger et al. 1994).

Extravagance vs Reserve

Individuals who score high on the Extravagance subscale tend to be extravagant with their money, energy, and feelings. They may impress others as gallant, flamboyant, and unrestrained. For example, they

prefer spending money rather than saving it. Consequently, it is hard for them to save money, even for special plans or vacations. They like to live “at the edge”, that is pushing at the limits of their resources and financial capacities.

In contrast, individuals who score low on the Extravagance subscale are described as reserved, controlled, or restrained. These individuals typically do not waste their money, energy, and feelings. Rather, they may impress others as frugal or stingy because they are slow to become interested in spending or acquiring things or giving them up (Cloninger 1987, Cloninger et al. 1994).

Disorderliness vs Regimentation

High scorers on this subscale tend to be quick tempered and disorderly. In other words, they are quick to lose their temper, so they often show and express anger outwardly when they do not get what they want when they want it. They typically prefer activities without strict rules and regulations. They do not like fixed routines and rules. They run away from whatever is frustrating, boring or uncomfortable for them physically or psychologically.

In contrast, individuals who score low on this subscale tend to be organized, orderly, methodical, and systematic. They typically prefer activities with strict rules and regulations. They are able to delay gratification when frustrated longer than most people. They are slow to lose their temper, that is, to show anger outwardly (Cloninger 1987, Cloninger et al. 1994).

Reward Dependence

Reward Dependence is a multifaceted higher order temperament trait consists of the following three aspects of lower order traits:

- Sentimentality vs Tough Mindedness (RD1)
- Attachment vs Detachment (RD3)
- Dependence vs Independence (RD4)

Individuals who score high in Reward Dependence tend to be tender-hearted, loving and warm, sensitive, dedicated, dependent, and sociable. They seek social contact and are open to communication with other people. Typically, they find people they like everywhere they go. A major advantage of high Reward Dependence is the sensitivity to social cues, which facilitates warm social relations and understanding of others' feelings. A major disadvantage of high Reward Dependence involves the ease with which other people can influence the dependent person's views and feelings, possibly leading to loss of objectivity.

Individuals low on the Reward Dependence are often described as practical, tough minded, cold, and socially insensitive. They are content to be alone and rarely initiate open communication with others. They prefer to keep their distance and typically have difficulties in finding something in common with other people. An advantage of low Reward Dependence is that independence from sentimental considerations

leads to practical and objective views that are not romanticized by wishful thinking or efforts to please others. This social detachment can also be a disadvantage when lack of sensitivity in social communication interferes with the cultivation of beneficial social affiliations (Cloninger 1987, Cloninger et al. 1994).

Reward Dependence Facets

Sentimentality (RD1)

High scorers on the Sentimentality subscale are described as sentimental, sympathetic, understanding individuals who tend to be deeply moved by sentimental appeals. They tend to show their emotions easily in presence of others. They report that they experience delegated emotions intensely, that is, they personally experience what others around them are feeling.

In contrast, individuals who score low on this subscale are described as practical. These people tend to be tough minded and coolly detached. They are rarely moved by sentimental appeals, and impress others as odd, cold or aloof. These individuals find sad songs and movies pretty boring. They are not sensitive to feelings of other people, so that it is difficult for them to establish social relationship (Cloninger 1987, Cloninger et al. 1994).

Attachment vs Detachment (RD3)

High scorers on the Attachment subscale prefer intimacy over privacy. They like to discuss their experiences and feelings openly with friends instead of keeping them to themselves. These persons tend to form warm and lasting social attachments. As a result, they tend to be sensitive to rejection and insults.

In contrast, low scorers on the Attachment subscale manifest more or less pronounced detachment and disinterest in social relationships. They prefer privacy over intimacy and are thus often described as self contained. These individuals typically do not share their intimate feelings with others. They impress others as alienated, detached, and distant “loners” who are usually indifferent to rejection and insults (Cloninger 1987, Cloninger et al. 1994).

Dependence vs Independence (RD4)

Individuals with high scorers on this subscale are dependent on emotional support and approval from others. They care deeply how other people regard them, and may even seek or stimulate overprotection and dominance in others. They may be reluctant to make decisions or do things on their own. Dependent individuals seek support or protection and thus usually go out of their way to please other people. As a consequence, they are easily hurt by criticism and disapproval. Dependent individuals tend to be preoccupied with fears of being abandoned. Thus they are very sensitive to social cues and highly responsive to social pressure.

In contrast, low scorers on this subscale neither depend on nor actively seek emotional support and approval from other people. These individuals are not sensitive to social pressure and criticism. They ra-

rely yield to the wishes of others and typically do not try to please others in order to get protection or emotional support. Rather, they impress others as independent, self-sufficient, and unresponsive to social pressure (Cloninger 1987, Cloninger et al. 1994).

Persistence

In the present version of TCI (Cloninger et al. 1993), this temperament dimension is represented with a single 8 item scale which describes to some extent four distinct behavior paradigms that can explain maintenance of a behavior. These includes eagerness of effort in response to signals of anticipated reward versus laziness, work hardened in response to intermittent punishment versus spoiled by consistent rewards and non punishment, ambitious overachieving in response to intermittent frustrative non reward versus underachieving, and perfectionistic perseverance in response to intermittent reward versus pragmatic quitting when not consistently rewarded.

Individuals high in Persistence tend to be industrious, hard-working, persistent, and stable despite frustration and fatigue. They typically intensify their effort in response to anticipated reward. They are ready to volunteer when there is something to be done, and are eager to start work on any assigned duty. Persistent persons tend to perceive frustration and fatigue as a personal challenge. They do not give up easily and, in fact, tend to work extra hard when criticized or confronted with mistakes in their work. Highly persistent persons tend to be ambitious overachievers who are willing to make major sacrifices to be a success. A highly persistent individual may tend to be a perfectionist and a workaholic who pushes him/herself far beyond what is necessary to get by. High Persistence is an adaptive behavioral strategy when rewards are intermittent but the contingencies remain stable. However, when the contingencies change rapidly, perseveration becomes maladaptive.

When reward contingencies are stable, individuals low in Persistence are viewed as indolent, inactive, unreliable, unstable and erratic on the basis of both self-reports and interviewer ratings. They rarely intensify their effort even in response to anticipated reward. These persons rarely volunteer for anything they do not have to do, and typically go slow in starting work, even if it is easy to do. They tend to give up easily when faced with frustration, criticism, obstacles, and fatigue. These persons are usually satisfied with their current accomplishments, rarely strive for bigger and better things, and are frequently described as underachievers who could probably accomplish for than they actually do, but do not push themselves harder than it is necessary to get by. Low scorers manifest a low level of perseverance and repetitive behaviors even in response to intermittent reward. Low Persistence is an adaptive strategy when reward contingencies change rapidly and may be maladaptive

when rewards are infrequent but occur in the long run (Cloninger et al. 1993, Cloninger et al. 1994).

Self-Directedness

Self-Directedness is a multifaceted, higher order character trait consisting of the following five lower order traits:

- Responsibility vs Blaming (SD1)
- Purposefulness vs Lack of goal direction (SD2)
- Resourcefulness vs Inertia (SD3)
- Congruent Second nature vs Bad Habits (SD5)

Highly self-directed persons are described as mature, strong, self-sufficient, responsible, reliable, goal-oriented, constructive, and well-integrated individuals when they have the opportunity for personal leadership. They have good self-esteem and self-reliance. The most distinctive characteristics of self-directed individuals is that they are effective, able to adapt their behavior in accord with individually chosen, voluntary goals. When a self-directed individual is required to follow the orders of others in authority, they may be viewed as rebellious trouble maker because they challenge the goals and values of those in authority.

In contrast, individuals who are low in Self-Directedness are described as immature, weak, fragile, blaming, destructive, ineffective, irresponsible, unreliable, and poorly integrated when they are not conforming to the direction of a mature leader. They are frequently described by clinicians as immature or having a personality disorder. They seem to be lacking an internal organizational principle, which renders them unable to define, set, and pursue meaningful goals. Instead, they experience numerous minor, short term, frequently mutually exclusive motives, none of which can develop to the point of long lasting personal significance and realization (Cloninger et al. 1993, Cloninger et al. 1994).

Self-Directedness Facets

Responsibility vs Blaming(SD1)

Individuals who are high on this subscale typically feel free to choose what they will do. They recognize that their attitudes, behaviors, and problems generally reflect their own choices. They tend to accept responsibility for their attitudes and behavior. These individuals impress others as reliable and trustworthy persons.

In contrast, individuals who score low on the Responsibility subscale tend to blame other people and external circumstances for what is happening to them. They feel that their attitudes, behavior, and choices are determined by influences outside their control or against their will. They tend not to accept responsibility for their actions. These individuals impress others as unreliable and irresponsible persons (Cloninger et al. 1993, Cloninger et al. 1994).

Purposefulness vs Lack of Goal Direction (SD2)

Individuals who score high on this subscale are

usually described as goal-oriented or purposeful. They have a clear sense of meaning and direction in their lives. Typically, they have developed the ability to delay gratification to achieve their goals. Their activities are guided by their long-term goals and values.

In contrast, low scorers on the Purposefulness subscale struggle to find direction, purpose, and meaning in their lives. They are uncertain about long-term goals, and thus feel driven to react to current circumstances and immediate needs. They may feel that their life is empty and has little or no meaning beyond the reactive impulses of the moment. They are usually unable to delay gratification to achieve their goals (Cloninger et al. 1993, Cloninger et al. 1994).

Resourcefulness vs Inertia (SD3)

High scorers on this subscale are usually described as resourceful and efficient. They impress other people as productive, proactive, competent, and innovative individuals who rarely lack ideas on how to solve problems. These individuals tend to look at a difficult situation as a challenge or an opportunity.

In contrast, low scorers on the Resourcefulness subscale impress others as helpless, hopeless, and ineffective. These individuals have not developed skills and confidence in solving problems and thus feel unable and incompetent when faced with obstacles. They tend to wait others to take the lead in getting things done (Cloninger et al. 1993, Cloninger et al. 1994).

Self-Acceptance vs Self-Striving (SD4)

High scorers on this subscale are described as self-confident individuals who recognize and accept both their strengths and limitations. These individuals try to do the best that they can without pretending to be something they are not. Rather, they seem to accept and feel very comfortable with their actual mental and physical capacities, although they may try to improve these shortfalls by constructive training and effort.

In contrast, low scorers on the Self-Acceptance subscale are described as self-striving. These individuals tend to manifest low self-esteem. They neither accept nor enjoy their actual mental and physical capacities. They rather often pretend to be different than they really are. They tend to fantasize about unlimited wealth, importance, beauty, and eternal youth. When confronted with evidence to the contrary, they may become severely disturbed rather than trying to revise their goals and habits constructively (Cloninger et al. 1993, Cloninger et al. 1994).

Congruent Second Nature vs Bad Habits (SD5)

Individuals who score high on this subscale have developed a spectrum of goal-congruent, good habits so that they automatically act in accord with their long-term values and goals. This is achieved gradually as a consequence of self-discipline, but eventually becomes automatic ("second nature"). These habits usually develop through repeated practice and are typically stronger than most momentary impulses or persuasion. In other words, these individuals rarely

confuse their priorities and thus feel safe and self-trusting in many tempting situations.

In contrast, low scorers on this subscale manifest habits that are inconsistent with and make it hard for them to accomplish worthwhile goals ("goal-incongruent habits"). These people sometimes are perceived by others as self-defeating and weak-willed. Their will power appears to be too weak to overcome many strong temptations, even if they know they will suffer as a consequence (Cloninger et al. 1993, Cloninger et al. 1994).

Cooperativeness

Cooperativeness is a multifaceted higher order character trait that consists of the following five aspects or lower order traits:

- Social Acceptance vs Social Intolerance (C1)
- Empathy vs Social Disinterest (C2)
- Helpfulness vs Unhelpfulness (C3)
- Compassion vs Revengefulness (C4)
- Pure Hearted Principles (Integrated Conscience) vs Self-Serving Advantage (C5)

Cooperativeness has been formulated to account for individual differences in identification with and acceptance of other people. Highly cooperative people are described as empathetic, tolerant, compassionate, supportive, fair, and principled individuals who enjoy being of service to others and try to cooperate with others as much as possible. They understand and respect the preferences and needs of others as well as their own. This capacity is important in teamwork and social groups for a harmonious and balanced relationships to flourish, but is not needed by solitary individuals.

In contrast, low scorers on the Cooperativeness dimension are described as self absorbed, intolerant, critical, unhelpful, revengeful, and opportunistic. These individuals primarily look out for themselves. They tend to be inconsiderate of other's rights or feelings. If a social leader is self-directed but uncooperative, they are likely to be described as tyrant or jerk, because of a lack of empathy, compassion, and ethical principles (Cloninger et al. 1993, Cloninger et al. 1994).

Cooperativeness Facets

Social Acceptance vs Social Intolerance (C1)

Individuals who score high on this subscale are described as tolerant and friendly. They tend to accept other people as they are, even people with very different behaviors, ethics, opinions, values, or appearances.

In contrast, low scorers on this subscale are described as intolerant and unfriendly. They are typically impatient with and critical of other people, especially with people who have different goals and values (Cloninger et al. 1993, Cloninger et al. 1994).

Empathy vs Social Disinterest (C2)

High scorers on Empathy subscale typically try to imagine themselves "in other people's shoes". These individuals are highly attuned to and considerate of

other people's feelings. They tend to treat others with dignity and respect and often put aside their own judgement initially so they can better understand what other people are experiencing.

In contrast, low scorers on this subscale are described as insensitive. These individuals do not seem to be concerned about other's feelings. Rather, they seem to be unable to share in another's emotions, suffering, or hardship, or at least are unwilling to respect for, the goals and values of other people (Cloninger et al. 1993, Cloninger et al. 1994).

Helpfulness vs Unhelpfulness (C3)

High scorers on this subscale are described as helpful, supportive, and encouraging, or reassuring. These individuals enjoy being in service to others. They often share their skills and knowledge so that everyone comes out ahead. They like to work as part of a team, usually preferring this to working alone.

In contrast, low scorers on this subscale are described as self-centered, egoistic, or selfish. These people tend to be inconsiderate of other people and typically look out only for themselves, even working in a team of highly cooperative collaborators. They prefer to work alone or to be in charge of what is done (Cloninger et al. 1993, Cloninger et al. 1994).

Compassion vs Revengefulness (C4)

Individuals who score high on this subscale are described as compassionate, forgiving, charitable, and benevolent. They do not enjoy revenge and usually do not try to get even if they were treated badly.

In contrast, low scorers on this subscale enjoy getting revenge on people who hurt them. Their revengeful triumph can be either overt or disguised. The former is observed as active-aggressive behavior, such as hurting others physically, emotionally, and financially. The latter is observed as passive-aggressive behaviors, such as holding grudges, deliberate forgetfulness, stubbornness, and postponement (Cloninger et al. 1993, Cloninger et al. 1994).

Integrated Conscience vs Self-Serving (C5)

Individuals who score high on this subscale are described as honest, genuinely conscientious, and sincere persons who treat others in a consistently fair manner. These persons have incorporated stable ethical principles and scruples in both their professional and their social and interpersonal relationships.

In contrast, low scorers on this subscale are described as opportunistic. They would do whatever they can get away with to reach their goals without getting in immediate trouble. These individuals tend to treat others unfairly, in a biased, self-serving manner that usually reflects their own profit. They are thus frequently described as manipulative and deceitful (Cloninger et al. 1993, Cloninger et al. 1994).

Self-Transcendence

Self-Transcendence is a multifaceted higher order trait with following aspects or lower order traits:

- Creative Self-Forgetfulness vs Self-Conscious Experience (ST1)
- Transpersonal Identification vs Personal Identification (ST2)
- Spiritual Acceptance vs Rational Materialism (ST3)

Self-transcendent individuals are described as unpretentious, satisfied, patient, creative, selfless, and spiritual. In Eastern societies, they are described as enlightened and wise, whereas in Western societies the same traits may be described as naive. These individuals seem to tolerate ambiguity and uncertainty. They can fully enjoy most of their activities without having to know the outcome and without feeling the urge to control it. Self-transcendent individuals impress others as humble and modest persons who are content to accept the failure even of their best efforts and who are thankful for both their failures and their successes. High Self-Transcendence has adaptive advantages when a person is confronted with suffering and death, which is inevitable with advancing age.

In contrast, low scorers in Self-Transcendence tend to be proud, impatient, and unimaginative, unappreciative of art, self-aware, materialistic, and unfulfilled. They cannot tolerate ambiguity, uncertainty, and surprises. Instead, they strive for more control over almost everything. Low scorers on this dimension may impress others as pretentious persons who seem to be unable to be satisfied with what they have. Individuals low in Self-Transcendence are often admired in Western societies for their rational, scientific, and materialistic success. But, they may have difficulty accepting suffering and death which leads to difficulties in adjustment with advancing age (Cloninger et al. 1993, Cloninger et al. 1994).

Self-Transcendence Facets

Creative Self-Forgetfulness vs Self-Consciousness (ST1)

High scorers on this subscale tend to transcend their self-boundaries when deeply involved in a relationship or when concentrating on what they are doing. They tend to forget where they are for a while and to lose awareness of the passage of time. They may appear "in another world" or "absent minded". Such absorption is characteristic of "flow states", "peak experiences", or higher levels of insight meditation. Individuals who experience such self forgetfulness often are usually described as creative and original.

In contrast, low scorers on the Creative Self-Forgetfulness subscale are characterized by their tendency to remain aware of their individuality in a relationship or when concentrating on their work. These individuals are rarely deeply moved by art or beauty (Cloninger et al. 1993, Cloninger et al. 1994).

Transpersonal Identification vs Personal Identification (ST2)

High scorers on this subscale tend to experience and extraordinarily strong connection to nature and

the universe as a whole. They report feeling that everything seems to be part of one living organism. These individuals are often willing to make real personal sacrifices in order to make the world better place. They may be regarded as fuzzy-thinking idealists by some people (Cloninger et al. 1993).

In contrast, low scorers on the Transpersonal Identification subscale rarely experience strong connections to nature or people. They tend to be individualists who feel that they are neither directly nor indirectly responsible for what is going on with other people or the rest of the world. They are rarely willing to make sacrifices in order to make the world a better place unless they can document objectively some practical advantage (Cloninger et al. 1993, Cloninger et al. 1994).

Spiritual Acceptance vs Rational Materialism (ST3)

Individuals who score on this subscale often believe in miracles, extrasensory experiences, and other spiritual phenomena and influences such as telepathy and sixth sense. They are described as showing magical thinking. They may be vitalized and comforted by spiritual experiences, they may deal with suffering and even death through faith they have and which may involve communion with God.

In contrast, low scorers on this subscale accept only materialism and objective empiricism. These individuals are generally unwilling to accept things that cannot be scientifically explained. The disadvantage is in facing situations over which there is no control or possibility for evaluating by rational objective means as when confronted by inevitable death, suffering, or unjust punishments (Cloninger et al. 1993, Cloninger et al. 1994).

CLINICAL APPLICATIONS OF TCI

The TCI has proven useful in practical clinical work, notably in diagnosis, differential diagnosis and treatment planning of psychiatric disorders including anxiety, mood, eating, substance abuse disorders.

According to Biosocial Learning Theory of Personality (Cloninger 1986), individuals with various anxiety disorders are all expected to be high on Harm Avoidance. All available studies conform that individuals with all types of anxiety disorders are high in Harm Avoidance (Pfohl et al. 1990, Saviotti et al. 1991, Perna et al. 1992, Cowley et al. 1993, Richter et al. 1993, Tancer et al. 1994). The converse statement is not necessarily true: individuals who are high on Harm Avoidance do not necessarily have an anxiety disorder. They may have other forms of psychopathology or may be healthy despite tendency to worry and to be fearful, shy, and fatigable if they are mature in character and/or protected by a reassuring supportive environment.

According to Cloninger's theory of personality, all aspects of personality interact in influencing susceptibility to depression. Being high in both Harm Avoidance and Novelty Seeking produces internal appro-

ach avoidance conflicts that make it difficult to be happy and hopeful. This combination also impedes mature character development, so these individuals tend to be immature and dysthymic. The prediction that individuals with personality disorders or low Self-Directedness are expected to have frequent comorbid dysthymia and depression has been confirmed and replicated in clinical and student population (Svrakic et al 1993). In all four available studies of mood disorders, Harm Avoidance scores are much higher before treatment for depression than in the general population (Brown et al. 1992, Strakowski et al. 1992, Joffe et al. 1993, Joyce et al. 1994). A crucial question about the elevation in these scores involves the extent to which the deviations reflect lifelong personality traits versus effects of transient mood states. Harm Avoidance scores are less stable in depressed patients than in the general population and have been shown to covary with changes in depression (Brown et al. 1992).

Eating disorders may provide another clinical group in which personality assessment is important because different subtypes have impulsive vs compulsive patterns of motivated behavior. All eating disorder patients are high in Harm Avoidance, bulimics are also high in Novelty Seeking, whereas anorexics are high in Persistence (Bulik et al. 1992, Brewerton et al. 1993, Kleifield et al. 1993, Waller et al. 1993).

The personality profiles of alcoholics are clearly heterogeneous. Available studies show that adolescent onset alcohol abuse is often associated with antisocial temperament traits, especially high Novelty Seeking and low Harm Avoidance (Cloninger et al. 1987, Wills et al. 1994).

The classification of personality disorders using the TCI indicates that the presence of a personality disorder is likely if a person scores low on both Self-Directedness and Cooperativeness. Social aloofness is indicated by low Reward Dependence, impulsivity by high Novelty Seeking, and anxiety-proneness by Harm Avoidance (Svrakic et al. 1993, Goldman et al. 1994).

Since personality is only moderately heritable we can only test if the genetic antecedents of each personality dimension are independent of those of the other dimensions by doing large scale twin studies. Heath et al. (1994) demonstrated that scores on the four TPQ temperament dimensions were significantly heritable. Stallings et al (1996) demonstrated that heritability of each trait is substantial in both sexes but four dimensions of temperament have little or no genetic correlations with one another, that shows they are homogeneous and independent.

Brain imaging provides the most direct way of evaluating regional brain activity. George et al. (1994), using PET scan, studied the correlations of TCI with regional brain activity in healthy volunteers and found that Harm Avoidance was positively correlated with blood flow in the brainstem, cerebellum, and

right temporal cortex. Reward Dependence is negatively correlated with prefrontal activity bilaterally and there is a trend for Novelty Seeking to be positively correlated with blood flow in the brainstem and left caudate (unpublished data, personal communication). Menza and Mark (1994) tested the predicted relations of dopamine uptake to temperament by measuring the uptake of fluorodopa into the striatum of Parkinson's disease patients and found a positive correlation between dopa uptake into the caudate.

Other strategies that have been used to investigate the neurobiological theory underlying the TCI include neurochemical and neuroendocrine challenge studies. Unfortunately all of these studies have used TPQ and not measured the character scales of the TCI. As character at least partly reflects maturation of the brain, the neglect of the character may explain some inconsistencies between studies carried out so far (Pfohl et al. 1990, Simonsson et al. 1992, Joyce et al. 1994, Tancer et al. 1994, Ruegg et al. 1997).

In Cloninger's personality model following three sets of transmitters and their behavioral manifestations were hypothesized: (1) dopamine, Novelty Seeking (behavioral activation), (2) serotonin, Harm Avoidance (behavioral inhibition), and (3) norepinephrine, Reward Dependence (behavioral maintenance) (Cloninger 1987). Recently researchers reported that scores on Novelty Seeking are related to the dopamine receptor gene (Benjamin et al., 1996, Ebsstein et al., 1996).

TRANSLATIONS OF THE TCI

The TCI is a 240 items self-report inventory measuring the seven dimensions of personality. Each scale has three to five subscales except for Persistence, which has only one scale. Each item is rated with a two-point scale: "True" or "False".

Cloninger's TCI has been translated into several languages and also validation studies were conducted. So far; the Swedish version of the TCI (Brändström et al., 1998), the Dutch version of the TCI (De la Rie et al., 1998), the Japanese version of the TCI (Kijima et al., 2000), and the Spanish version of the TCI (Gutierrez et al., 2001) were developed and reliability and validation studies showed sound psychometric properties as in the original version.

RELIABILITY AND VALIDITY OF THE TURKISH VERSION OF THE TCI

Kose et al (2002) examined the psychometric properties of the Turkish version of the TCI in a healthy Turkish population that is broadly representative of the general population in Turkey and obtained normative data for the Turkish TCI. The TCI was translated to Turkish by a Turkish psychiatric researcher (Kose S.). The blind back-translation was done by another Turkish psychiatric researcher (Sayar K.) who had not seen the original items. This back-trans-

lation was compared with the original version. Following the revision of some items, a new version was back-translated again. The language was once again revised and reviewed by Kose S. and some items were changed to a more colloquial Turkish. To obtain cross-cultural content validity of the Turkish version of the TCI, the content of all items was examined in order to assess whether any items had difficult cultural connotations. None of the items was found to be irrelevant for the Turkish population. Careful scrutiny of the phrases used in the original version of the inventory indicated no difficulties in using them within the context of current Turkish culture. The final version was verified and approved by Cloninger.

The study group comprised 689 subjects, 366 male and 323 female, with a mean age of 26.32 ± 10.69 (range of 18-75 years). Trabzon Technical University group comprised 349 subjects, 165 male and 184 female, with a mean age of 20.76 ± 2.54 (range of 18-55 years). Ataturk University (Erzurum) group comprised 340 subjects, 201 male and 139 female, a mixture of undergraduates and others, with a mean age of 32.03 ± 12.67 (range of 19-75 years). Subjects who have a history of severe mental illness such as major depressive disorder, psychosis, anxiety disorder, OCD, autism, PTSD, mental retardation, suicide attempt, current substance abuse/dependence, history of neurological disease, or any psychotropic medication have been excluded. TCI scores were converted to raw scores for descriptive purposes in accordance with Cloninger's original normative data.

Turkish sample mean scores on the Novelty Seeking (except for the Exploratory/Excitability and Impulsiveness subscales), Reward Dependence, and Persistence scales were significantly lower than that for the US sample, whereas mean scores on the Harm Avoidance (except for Shyness subscale, $p=0.049$) scale were significantly higher than that for the US sample. Turkish sample mean scores on the Self-directedness (except for the Purposefulness subscale), Cooperativeness (Integrated Conscience, $p=0.038$), and Self-transcendence scales (except for the Self-forgetfulness subscale) were significantly lower than that for the US sample. Pearson correlations between Persistence and Harm Avoidance ($-.84$, $p<0.05$), Self-directedness and Persistence ($-.700$, $p<0.01$), Cooperativeness and Self-directedness ($.680$, $p<0.01$), Self-transcendence and Cooperativeness ($.762$, $p<0.01$) all exceeded .50 Cronbach coefficients for all scales were sufficiently high (.71 for whole scale) except those for Reward Dependence and Persistence.

The reliability and validity of the Turkish version of the TCI were supported by the distribution of scores, high internal consistency, and construct validity. This study demonstrated that the Turkish TCI measures the dimensions of Cloninger's seven-factor model of personality well.

Kose et al (2002) conducted a two-stage design

study and tested the predictive value of Turkish version of TCI in depression and anxiety in Turkish College Students. Study group comprised 109 subjects, 64 male and 45 female undergraduates with a mean age of 20.34 ± 1.24 (range of 18-30 years). Subjects were given the Hamilton Rating Scale for Depression, Beck Depression Inventory, the Hamilton Anxiety Scale, and Spielberger's State-Trait Anxiety Inventory at two different time frames, three months after the first administration. Subjects who have a history of severe mental illness such as major depressive disorder, psychosis, anxiety disorder, OCD, autism, PTSD, mental retardation, suicide attempt, current substance abuse/dependence, history of neurological disease, or any psychotropic medication were excluded.

The Turkish sample mean scores on the Reward Dependence and Persistence scales were significantly lower than that for the US sample, whereas mean scores on most subscales of the Harm Avoidance scale were significantly higher. Turkish sample mean scores were significantly lower than the US sample on most subscales of the Cooperativeness scale, but were higher on most subscales of the Self-transcendence scale. Paired sample t test revealed a statistically significant difference between Time 2 BDI and Time 1 BDI (8.91 ± 8.15 and 11.20 ± 8.14 , $p=.002$). The correlation coefficients between Time 2 STAI-Trait and Time 2 STAI-State scores ($r=.82$, $p<0.01$), Time 2 BDI and Time 1 BDI scores ($r=.59$, $p<0.01$), Time 2 HAM-A and Time 2 HAM-D scores ($r=.77$, $p<0.01$), Time 1 HAM-D and Time 1 BDI scores ($r=.50$, $p<0.01$), Time 1 HAM-D and Time 1 HAM-A scores ($r=.54$, $p<0.01$), Time 1 HAM-D and Time 2 BDI scores ($r=.52$, $p<0.01$), and Cooperativeness and Self-directedness scores ($r=.61$, $p<0.01$) all exceeded .50.

Regression analysis showed that Time 1 HAM-D scores would significantly predict Time 2 HAM-D scores ($F=3.391$, $r=.386$, $p=.000$); Time 1 HAM-A scores would significantly predict Time 2 HAM-A scores ($F=4.559$, $r=.468$, $p=.000$); Time 1 BDI ($F=10.379$, $r=.496$, $p=.000$) and NS scores ($F=10.379$, $r=.206$, $p=.017$) would significantly predict Time 2 BDI scores; Time 1 STAI-State and CO scores ($F=5.121$, $r=.237$, $p=.045$) would significantly predict Time 2 STAI-State scores ($F=5.121$, $r=.475$, $p=.000$); and Time 1 STAI-Trait scores would predict Time 2 STAI-Trait scores ($F=4.795$, $r=.474$, $p=.000$). In Turkish college sample, high internal consistency for TCI and depression and anxiety scales was obtained and only Novelty Seeking and Cooperativeness were found to be predictive for Time 2 depression and anxiety scores.

CONCLUSIONS

In conclusion, Cloninger's seven factor model of personality is a promising model and complementing earlier models which attempted to describe personality since it takes into account both temperament and character dimensions.

The TCI can be useful aid in assessment of personality disorders. The character scales are designed to distinguish whether a person has any personality disorders, and the temperament scales allow the differential diagnosis of categorical subtypes of personality disorders. The TCI also helps to identify comorbid psychopathology since clinical differences between and within different types of psychopathological syndromes (e.g., anxiety, mood, eating, substance abuse disorders) are related to differences in TCI profiles.

The TCI is also widely being used in multiple neuroimaging, neuropsychological, neurogenetic, neuroendocrine studies assessing correlations of brain lesions, neuropsychiatric disorders, and also normal variation.

The availability of Turkish version of TCI will provide significant data for a better understanding of the temperament and character scales in both healthy and psychiatric population in Turkey and will also provide cross cultural data to compare the differences between Turkish and Western societies on personality level.

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