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Temperament, Eysenck's PEN system, and humor-related traits

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Running Head: Temperament, PEN system, and humor

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Abstract

The Eysenckian PEN system of personality (Eysenck 1991; Eysenck and Eysenck 1985), comprising the superfactors Psychoticism (P), Extraversion (E), and Neuroticism (N) is used as a means to locate different humor-related traits. A sample of 159 German adults answered a sample of temperamental traits relating to the PEN system as well as five humor-related questionnaires. The temperament inventories investigated comprised the following: the Eysenck Personality Questionnaire-revised (EPQ-R; Eysenck, Eysenck, and Barrett 1985), the I.7 Impulsiveness Questionnaire (I.7; Eysenck, Pearson, Easting, and Allsopp 1985), the Sensation Seeking Scale (SSS; Zuckerman 1979), the STQ (Claridge and Broks 1984), the Affect Intensity Measure (AIM; Larsen and Diener 1987), the Pavlovian Temperament Survey (PTS; Strelau, Angleitner, Bantelmann, and Ruch 1990), and the Dimensions of Temperament Survey-Revised (DOTS-R; Windle and Lerner 1986). The humor inventories were the following: the Situational Humor Response Questionnaire (SHRQ; Martin and Lefcourt 1984), the Coping Humor Scale (CHS; Martin and Lefcourt 1983), Svebak's

2 *Temperament, Eysenck's PEN system, and humor-related traits*

Sense of Humor Questionnaire (SHQ; Svebak 1974), the Telic Dominance Scale (TDS; Murgatroyd, Rushton, Apter, and Ray 1978), and the Sense of Humor Questionnaire by Ziv (SHQZ; Ziv 1979).

A joint factor analysis yielded factors of Extraversion, Psychoticism, and Neuroticism. Primarily E (and to a minor extent P) appeared to be relevant for the location of the current humor questionnaires. The Extraverts' sense of humor seemed to be characterized by their greater susceptibility for positive affect, smiling and laughter, enjoyment of entertaining others, carefreeness, and their lower degree of seriousness. A separate factor analysis of the humor scales yielded factors of surgency and seriousness, which were associated with E and low P, respectively. An appraisal of the attempts to define and measure the sense of humor construct is undertaken.

Introduction

At a formal level, the expression "sense of humor" refers to a personality characteristic aimed at describing habitual individual differences in humor-related behavior. It is a descriptive *hypothetical construct*, an invention, not an "existing" entity. A certain conceptualization of sense of humor may be *useful* or *not useful*, but not *true* or *false*. Its usefulness has to be demonstrated (also as compared to already existing concepts) by predicting individual differences primarily in humor-related phenomena, not in other domains of behavior.

As a personality trait, the "sense of humor" refers to a *disposition* for humor-related behavior not to the behavior itself. It can not be observed directly but *inferred* via indicators. Various conceptualizations of the sense of humor or facets of this construct have been proposed and a large number of measurement devices (including self- and peer-evaluation techniques, objective tests) have been constructed (for reviews see Ruch 1990, 1993). There are many facets of humor behavior (e.g., comprehension, enjoyment, creation, initiation, entertainment), and they involve many domains of *psychic functioning* (e.g., perception, cognition, emotion, motivation, attitudes, performance). Hence, a comprehensive approach to the sense of humor, i.e., one which is aimed at representing the whole realm of humor-related behavior, will most likely arrive at a multidimensional concept. The state of the art in defining and measuring this concept, however, is far from being satisfactory (see Thorson and Powell 1993a). Nevertheless, several facets of the sense of humor-construct have been proposed and tools to their

3 Temperament, Eysenck's PEN system, and humor-related traits

assessment were constructed. Some of these assessment tools, most frequently, questionnaires, refer to habitual forms of the humor behaviors depicted above¹. In other words, the tendency to laugh easily, to initiate humor, etc. are seen as components of a sense of humor-trait. The present study examines the location of these humor-related traits and habits in the PEN model of personality.

While a sense of humor-construct obviously would be a good predictor of individual differences in humor-related behavior, it should be noted that other more general personality traits might be successful in doing so as well. Hence, a sense of humor-construct is not *per se* necessary for humor research. Indeed, some theorists have argued against the use of this concept (e.g., McGhee 1979).

Finally, the sense of humor-construct should be considered a node in a net of personality traits not an isolated phenomenon. Thus, the study of a new conceptualization of sense of humor should also include the exploration of its relationship to already existing traits. Attempts to locate individual conceptualizations of sense of humor in comprehensive personality systems were sparse (Hehl and Ruch 1985; Ruch and Hehl 1985), however, especially among the questionnaire measures of sense of humor (Ruch and Deckers 1993; Thorson and Powell 1993b).

The present study is aimed at locating several sense of humor questionnaires in the Eysenckian PEN system of personality. The choice of a system of temperament (rather than one of attitudes, values, or intellect) is determined by the nature of the conceptualizations of the humor questionnaires to be studied. The basic assumption is that the sense of humor and temperament share some common dimensions.

The PEN system

The PEN system is a factor analytically based descriptive taxonomy of personality containing the three superfactors Psychoticism, Extraversion, and Neuroticism (Eysenck and Eysenck 1985). The PEN system assumes a hierarchical arrangement of personality characteristics with Psychoticism (versus Impulse Control), Extraversion (versus Introversion), and Neuroticism (versus Emotional Stability) located at the highest level. They are referred to as *types* (or second-order factors in factor analytic terms) as opposed to *traits* (or first-order factors) defining them. The type concept of *Psychoticism*, or P, is made up of traits like aggressive, cold, egocentric,

4 Temperament, Eysenck's PEN system, and humor-related traits

impersonal, impulsive, antisocial, unemphatic, creative, and tough-minded. The traits whose intercorrelations give rise to the type concept of *Extraversion*, or E, are sociable, lively, active, assertive, sensation-seeking, carefree, dominant, surgent, and venturesome. Finally, *Neuroticism*, or N, is made up of traits like anxious, depressed, guilt feelings, low self-esteem, tense, irrational, shy, moody, and emotional (Eysenck and Eysenck 1985). These superfactors were extracted from different inventories and show a high degree of generizability across different cultures. They also resemble factors extracted from animal behavior.

The PEN system also forms the basis for a causal theory of personality. There are many studies aimed at investigating the genetic architecture of P, E, and N and at identifying the psychophysiological and biochemical factors relating to them. Eysenck has suggested cortical arousal, mediated by the reticular formation, as being responsible for individual differences in Extraversion, and differences in limbic system arousal, mediated by the sympathetic nervous system, as being responsible for individual differences in Neuroticism. More recently, Psychoticism was related to the hormonal system (Eysenck and Eysenck 1976).

The superfactors P, E, and N and temperament

How do selected temperament traits relate to the PEN system? Due to their status as higher-order factors of temperament, the PEN system was frequently used as a frame of reference for locating newly developed concepts. This usually took the form of computing correlations among these traits and P, E, and N or by performing a joint factor analysis. The Eysenck Personality Questionnaire (EPQ; Eysenck and Eysenck 1975) was introduced for the assessment of P, E, and N. It also contains a Lie (L) scale, a measure of Social Desirability. The EPQ-R (Eysenck, Eysenck, and Barrett 1985) was developed in an attempt to improve the psychometric properties of the questionnaire.

In the following a brief introduction to the temperament traits investigated in the present study will be given. This will also include studies examining their relationship with the PEN system. These temperament traits will be providing the basis for determining the PEN-factors at an empirical level.

Impulsiveness and Venturesomeness and the PEN system. Initially Impulsivity was seen to be a constituent part of Extraversion, together with sociability and liveliness. However, when the Eysencks began to study

5 Temperament, Eysenck's PEN system, and humor-related traits

Psychoticism as a second-order factor of personality it became clear that two components of impulsivity had to be distinguished: Venturesomeness and Impulsiveness. The Eysencks developed an Impulsiveness questionnaire (latest version I.7) measuring these two traits as well as Empathy. Their position in the PEN system has been studied extensively in children (Eysenck, Easting, and Pearson 1984) and adults (Corulla 1987, 1988; Eysenck and Eysenck 1978; Eysenck, Pearson, Easting, and Allsopp 1985).

Impulsiveness is positively correlated with P, E and N but most highly so with P (Corulla 1987, 1988; Eysenck et al. 1985). Venturesomeness correlates positively with E and P but is more aligned with E. Whereas the correlations obtained between Venturesomeness and N are typically negative they are not always significant.

Affect intensity and the PEN system. Affect intensity (AI) was introduced to describe stable interindividual differences in the magnitude of emotional reactions to emotion-inducing situations (Larsen and Diener 1987). It is assumed that the intensity of an individual's affective responsiveness generalizes across different emotion categories. This AI-dimension is defined at one pole by persons who experience their emotions only mildly and with minor fluctuations, and at the other pole by persons who experience their emotions quite strongly and who are emotionally reactive and variable. The *arousal regulation theory of affect intensity* (Larsen and Diener 1987) suggests that emotional response intensity functions within persons as a compensatory mechanism for the regulation of internal stimulation level (i.e., arousal). Larsen and Diener (1987) suggest that intensity of emotional responses serves as a source of stimulation for use of arousal regulation, and individuals develop strong emotional responsiveness to compensate for chronically low levels of baseline arousal.

Given this view of the biological basis of affect intensity a positive relationship between both Extraversion and Affect Intensity can be expected. In fact, studies showed AI to be positively correlated with both superfactors Extraversion and Neuroticism (Goldsmith and Walters 1989; Williams 1989). AI does not relate to Psychoticism.

Schizotypal and borderline personality traits and the PEN system. A fundamental assumption underlying the concept of Psychoticism is the postulate by Eysenck and Eysenck (1976) that a dimensional predisposition exists towards different kinds of psychotic breakdowns in the general population. A further attempt to measure "psychotic" traits in normals was undertaken by Claridge and Broks (1984), who developed the STQ, a two-

6 Temperament, Eysenck's PEN system, and humor-related traits

scale questionnaire assessing Schizotypal (STA) and Borderline (STB) personality traits. However, they took a more clinical viewpoint in the measurement of these predisposing characteristics and they developed more symptom based scales.

Information regarding the location of the STA and STB scales in the PEN system is available from studies conducted in England (Claridge and Hewitt 1987) and Spain (Muntaner, Garcia-Sevilla, Fernandez, and Torrubia 1988). It turns out that the STA and STB scales correlated primarily positively with Neuroticism. Both scales also correlated positively with P, however, only the STB (Borderline Personality) scale yields higher coefficients.

Sensation Seeking and the PEN system. The trait of Sensation Seeking (SS) has been defined as "the need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experience." (Zuckerman 1979: 10). Sensation seeking is understood as a biosocial trait with a physiological underpinning and a strong genetical component. Four components of SS are distinguished: Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (Dis), and Boredom Susceptibility (BS).

Extraversion and Sensation Seeking were expected to correlate positively (Eysenck and Zuckerman 1978) since both traits have been theoretically related to the construct of an "optimal level of arousal." Furthermore, a positive relationship between Sensation Seeking and Psychoticism was expected, since both traits share elements like non-conformity, atypical attitudes indicating a lack of socialization, or weak superego. The results of a variety of studies (e.g., Corulla 1988) show that Sensation Seeking falls between the P and E dimensions and there is no relationship between SS and Neuroticism.

The revised Dimensions of Temperament Survey (DOTS-R) and the PEN system. The DOTS-R (Windle and Lerner 1986) results from an attempt to assess the nine temperament categories proposed by Thomas and Chess (1977) across the age span from childhood to early adulthood. However, after applying factor analysis to the compiled item pool, they arrived at factors partly different from the temperament categories proposed. The 10 factors for the adult samples are Activity Level-General, Activity Level-Sleep, Approach-Withdrawal, Flexibility-Rigidity, Mood Quality, Rhythmicity-Sleep, Rhythmicity-Eating, Rhythmicity-Daily Habits, Low Distractibility, and Persistence. Windle (1989) found Extraversion to be positively correlated with four of the 10 scales, namely Activity Level-General, Approach-Withdrawal, Mood Quality, and Flexibility-Rigidity.

7 *Temperament, Eysenck's PEN system, and humor-related traits*

Neuroticism correlated positively with Activity Level-General and negatively with Flexibility-Rigidity, Mood Quality, Approach-Withdrawal, (low) Distractibility, Rhythmicity-Sleep and Rhythmicity-Eating. The scales Rhythmicity-Daily Habits, Persistence and Activity Level-Sleep did not show systematic relationships with E and N.

The present study will explore the relationship between the DOTS-R and P. Prior, Crook, Stripp, Power, and Joseph (1986) mention that none of the five original DOTS-scales were included in the prediction of Psychoticism in a step-wise multiple regression analysis.

The Pavlovian Nervous System Properties and the PEN system. Based on his studies with dogs, Pavlov postulated the central nervous system (CNS) properties of "strength," "equilibrium" and "mobility." According to Pavlov (1951-1952), Strength of Excitation (SE) reflects the ability to endure intense or long-lasting stimulation without passing into transmarginal inhibition. Strength of Inhibition (SI) reveals itself in the ability to sustain a state of conditioned inhibition such as extinction, differentiation or delay. The essence of Mobility (Mo) of nervous processes consists in the ability of the CNS to respond adequately to continuous changes in the surroundings.

The Pavlovian concepts of CNS properties were very influential with respect to the construction of Western temperament theories (see Strelau, Angleitner, and Ruch 1989). For example Pavlov's idea to explain individual differences in the efficiency of conditioning by means of particular features of CNS processes--excitation and inhibition--was for Eysenck (1970) one of the starting points in developing his view on the physiological basis of Extraversion-Introversion. A review of many studies allowed for a reliable location of the Pavlovian Temperament Survey (PTS) scales in the PEN system (Strelau, Angleitner, and Ruch 1989). According to these studies, SE correlates positively with E and negatively with N. SI correlates negatively with N and P. MO correlates positively (and even more highly so than SE) with Extraversion and negatively with Neuroticism.

The PEN system and humor-related traits

The PEN personality model claims to provide a comprehensive taxonomic system for temperamental traits. The question arises whether it can also account for humor-related phenomena. In fact, there is much grounds to assume that it is predominantly the broad superfactor of Extraversion which

8 Temperament, Eysenck's PEN system, and humor-related traits

relates to interindividual differences in the realm of humor. Firstly, hypotheses about such relationships can be derived from the contemporary models and the definition of Extraversion (Eysenck and Eysenck 1985). Secondly, subfactors of extraversion provide links to this domain. For example, the primary factor of *urgency* refers to being cheerful, witty, liking to laugh etc. Thirdly, typological precursors of the Extraversion dimension were even more explicitly related to the sense of humor construct. For example, being cheerful, humorous and witty had a central place in Kretschmer's (1961) conceptualization of the "cyclothymic" temperament (which, in the form of Cattell's 16PF-A scale, is a marker of E).

In the following theoretical links between Extraversion and humor-related behavior will be outlined. Based on these considerations hypotheses regarding the relationship between Extraversion and various conceptualizations of the sense of humor or facets thereof will be advanced.

Extraversion as a general disposition for positive affect. It was postulated that E is a predictor of the intensity and variability of positive affect (Eysenck and Eysenck 1985). As regards to *mood states*, Extraverts are expected to show variation between positive affect and neutrality whereas the mood states of high N scorers are expected to vary predominantly between negative affect and neutrality. Thus, Extraverts can be expected to be in a positive mood more frequently than introverts. One type of positive mood, cheerfulness, has been demonstrated to represent a state of lowered threshold for the induction of smiling, laughter, and exhilaration (Ruch 1990). It can be expected that Extraverts are more susceptible to the induction of positive affect than Introverts. Extraverts are more likely than Introverts to respond with joy to a given pleasure-inducing situation. Recently the postulate that Extraverts have a tendency to "laugh and be merry" (Eysenck and Eysenck 1975: 9) has been explicitly tested and confirmed (Ruch 1994). While Extraversion predicted both the frequency and intensity of humor-induced facial exhilaration (i.e., smiling and laughter), Extraverts and Introverts did not differ much with respect to the perceived funniness of the stimuli. Thus, smiling and laughter seem to be habitual behavioral acts typifying Extraversion.

Based on the hypotheses of an Extraversion-positive affect-relationship it can be predicted that Extraversion will correlate positively with the *Situational Humor Response Questionnaire* (SHRQ; Martin and Lefcourt 1984), a scale of *Humor Appreciation* (Ziv 1979), and the *Emotional Expressiveness* subscale of the *Sense of Humor Questionnaire* (Svebak

9 Temperament, Eysenck's PEN system, and humor-related traits

1974). The SHRQ assesses "the frequency with which the individual smiles, laughs, or otherwise displays amusement in a variety of situations" (Lefcourt and Martin 1986: 22). While Ziv (1984: 111) defines humor appreciation as "the ability to understand and enjoy messages containing humor creativity, as well as situations that are incongruous but not menacing," the items of the *Humor Appreciation* (SHQZ HA) scale mostly relate to the frequency and intensity of laughter and amusement (e.g., laughing easily, tearing during laughter). Finally, *Emotional Expressiveness* (SHQ EE) refers to the tendency to freely express one's emotions.

All three scales refer to the behavioral acts of smiling and laughter, and to positive affect and are thus expected to correlate positively with EPQ-R E. It should be mentioned that the DOTS-R Mood Quality scale basically consists of items asking for the frequency of laughter and smiling as well (without specifying eliciting situations as the SHRQ does) and hence might serve as a further marker of positive affect/laughter in the present study. Since the SHQ EE also contains items relating to being an impulsive person, positive correlations with P and N can be expected as well (like for I.7 Imp).

Recently, Ruch and Deckers (1993) confirmed a positive relationship between Extraversion and the SHRQ on the basis of the present German and an American sample. Additionally, however, there was a minor positive correlation with P, which was based only on a few situations and was interpreted to reflect peculiarities of the situations depicted rather than suggesting that Psychoticism is a predictor of laughter propensity *per se*.

Extraversion as a disposition for the enjoyment of entertaining others. While Extraverts generally are more sociable, active, and talkative than Introverts, they also seem to specifically enjoy entertaining others, being witty, cracking jokes, playing practical jokes etc. Not surprisingly, an affirmative answer to the question whether one likes telling jokes and funny stories to one's friends is credited one point on the Extraversion scale of the EPQ. Constructs with a similar scope (e.g., need for play, need for exhibition) are known to be subfactors of Extraversion. Thus, extraversion seems also to account for individual differences in more active sorts of humor behavior.

The hypotheses allow to predict a positive correlation between Extraversion and the *Humor Creativity* scale (Ziv 1979). While Ziv (1984: 111) defines humor creativity as "the ability to perceive relationships between people, objects, or ideas in an incongruous way, as well as the ability to communicate this perception to others" some of the items of the

humor creativity (SHQZ HC) scale refer to entertaining others (e.g., my friends expect me to make them laugh). Ziv and Gadish (1990) did report a relationship between Extraversion and the SHQZ-scales which was not based on the present rationale, however.

Extraversion and carefreeness. Extraverts are considered to be carefree, easy-going, lighthearted, optimistic, and not taking things too seriously (Eysenck and Eysenck 1975). This might be a predisposition of not losing one's humor in the face of adversity and of being able to laugh, to try saying something funny, or finding something comical even in trying situations.

This aspect of humor is covered by the *Coping Humor Scale* (CHS; Martin and Lefcourt 1984) which is considered to assess "the degree to which individuals make use of humor to cope with the stressful events they encounter in their lives" (Lefcourt and Martin 1986: 28). The predominance of positive affect even in trying situation and maybe also the tendency to take things not too seriously suggest a positive correlation between the CHS and Extraversion, albeit to a lower extent than for the positive emotion scales. The aspect of not losing the sense of humor in trying situations suggests an involvement of emotional stability (i.e., low N) in the CHS and hence a negative correlation with EPQ-R Neuroticism is expected as well.

Introversion and seriousness. Extraversion might vary inversely with traits representing the *low humor pole*. For example, the typical introvert is considered to take "matters of everyday life with proper seriousness," he "tends to plan ahead," and "does not like excitement" (Eysenck and Eysenck 1975: 9).

Seriousmindedness, planning orientation, and arousal avoidance are the components of the *telic dominance* (Apter 1982) construct, as measured by the TDS (Murgatroyd, Rushton, Apter, and Ray 1978). While Murgatroyd et al. (1978) did not find a relationship between *telic dominance* and the Eysenck scales, Matthews (1985) found negative correlations between a 16 PF-based second order factor of Extraversion and the TDS-scales of arousal avoidance (TDS SM) and planning orientation (TDS PO), and with the total scale of telic dominance. For seriousmindedness (TDS SM) a negative coefficient was obtained, which, however, failed to be significant. So did the negative correlation between seriousness and surgency (16PF-F), a marker of extraversion.

However, Psychoticism was neglected so far. The high P-scorer is said not to be planning ahead and to enjoy highly stimulating situations. Hence it can be hypothesized that the TDS-scales are additionally inversely related to P. First support for this hypothesis comes from the fact that

11 Temperament, Eysenck's PEN system, and humor-related traits

seriousmindedness and planning orientation correlate positively with super ego strength, a 16PF-marker of (low) Psychoticism (Matthews 1985).

The above mentioned hypotheses allow to expect that Extraversion relates to humor in a variety of ways both at the level of the *actual* and the *habitual* form of the humor-related behaviors. While it is strongly recommended to include Extraversion as a personality variable in future experiments of humor and test, for example, the hypotheses that Extraverts laugh or initiate humor more frequently than Introverts do, the present study will relate Extraversion to humor at the habitual level; i.e., to sense of humor-tests.

Two of the scales to be studied do not provide such clear relationships with Extraversion, namely the other components of Svebak's conception of the sense of humor. *Metamessage Sensitivity* (SHQ MMS) is understood as the ability to recognize humor in situations. Partly one could expect that more serious people would be less sensitive to such messages. Also, items relate to having much cause for *amusement* during an ordinary day and this provides a link with the positive affect facet of extraversion. *Personal Liking of Humor* (SHQ LH) relates to the enjoyment of humor and acceptance of the humorous role. Such aspects seem to be primarily related to attitudes and convictions. Also from the phrasing of the items no link with Extraversion is apparent.

Thus, the aim of the present study is fourfold. A joint factor analysis of the temperament and the humor scales will be performed to locate a) the temperament scales and b) the humor scales in the resulting factor space. A separate factor analysis of the humor scales will be performed to c) determine their basic dimensions. Furthermore, d) the psychometric properties of the German adaptations of the humor scales will be determined.

Methods

Subjects

The sample comprised 159 German adults of the Düsseldorf area (86 men and 73 women), aged from 20 to 67 ($M = 33.6$; $SD = 12.9$). One third of the subjects were undergraduate psychology students at the beginning of a personality course. The other Ss consisted of relatives and friends of the students and were recruited by them

Instruments

German translations of the following 12 inventories have been given. If not stated differently the questionnaires were translated into German by the author and most of them are currently adapted for use in the German culture. The temperament inventories were the following:

(1) *The Eysenck Personality Questionnaire-Revised* (EPQ-R; Eysenck, Eysenck, and Barrett 1985) in a German Adaptation by Ruch and Hehl (1989). This is a 102-item questionnaire containing four scales; Psychoticism (P; 32 items), Extraversion (E; 23 items), Neuroticism (N; 25 items), and Lie (L; 22 items).

(2) The *I.7 Impulsiveness Questionnaire* (I.7; Eysenck, Pearson, Easting, and Allsopp 1985). This is a 54-item questionnaire containing three scales; Impulsiveness (Imp; 19 items), Venturesomeness (Vent; 16 items), and Empathy (Emp; 19 items).

(3) The *Sensation Seeking Scale* (SSS, Zuckerman 1979) as translated and adapted by Unterweger (1980). This questionnaire includes four subscales: Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (DIS), and Boredom Susceptibility (BS). This revision excluded some of the items from SSS-IV with insufficient properties.

(4) The STQ (Claridge and Broks 1984). This questionnaire includes the STA (37 items) and STB (18 items) scales aimed at measuring Schizotypal and Borderline personality traits, respectively. These four questionnaires are in a yes/no format.

(5) The *Affect Intensity Measure* (AIM; Larsen and Diener 1987). This is a 40-item questionnaire of Affect Intensity in a 6-point Likert scale format.

(6) The *Pavlovian Temperament Survey* (PTS, Strelau, Angleitner, Bantelmann, and Ruch 1990) measuring the Pavlovian nervous system properties: Strength of Excitation (SE), Strength of Inhibition (SI), and Mobility (MO). Furthermore, a Social Desirability (SD) scale is included. The 166 items are answered in a 4-point Likert scale format.

(7) The *Revised Dimensions of Temperament Survey-Adult* (DOTS-R Adult) by Windle and Lerner (1986) and translated by Angleitner, Köhler, Ruch, and Silny. The DOTS-R is a 54-items questionnaire in a 4-point Likert scale format measuring 10 temperament dimensions: Activity Level-General, Activity Level-Sleep, Approach-Withdrawal, Flexibility/Rigidity, Mood Quality, Rhythmicity-Sleep, Rhythmicity-Eating, Rhythmicity-Daily Habits, Distractibility, and Persistence.

The humor-related inventories² were the following:

13 Temperament, Eysenck's PEN system, and humor-related traits

(8) The *Situational Humor Response Questionnaire* (SHRQ) by Martin and Lefcourt (1984) assesses the individual capacity to respond to a variety of situations (18 items) with amusement, smiling or laughter even if they are unexpected or demanding. Furthermore, three items are included which relate to self perception of humor.

(9) The *Coping Humor Scale* (CHS) by Martin and Lefcourt (1983) is a 7-item scale in a 4-point Likert-type format which assesses the degree to which individuals make use of humor to cope with the stressful events they encounter in their lives.

(10) The *Sense of Humor Questionnaire* (SHQ) by Svebak (1974) contains 21 items in a 4-point Likert-type format assessing generalized individual differences in humor production and appreciation. There are three subscales, Metamessage Sensitivity (MMS), Personal Liking of Humor (LH), and Emotional Expressiveness (EE).

(11) The *Sense of Humor Questionnaire* (SHQZ; Ziv 1979, 1981) contains 14 items in a 7-point Likert format assessing two components of the sense of humor: Humor Appreciation (HA) and Humor Creativity (HC).

(12) The *Telic Dominance Scale*³ (TDS; Murgatroyd, Rushton, Apter, and Ray 1978) is a 42-items questionnaire in a 3-point answer format measuring three components of telic dominance: *Seriousmindedness* (SM), *Planning Orientation* (PO), and *Arousal Avoidance* (TDS AA).

Procedure

All subjects were tested individually. The questionnaires were grouped in three packages and were given to Ss in three week intervals. Subjects were instructed to complete the tests at home, alone, without any hurry. They were asked to return them after a week.

Results

Means, standard deviations and reliabilities (coefficient Alpha) of the temperamental and the humor-related scales, and their correlations with sex and age are given in Table 1.

Table 1. Means, Standard Deviations and Reliability (Coefficient Alpha) for the different scales and their correlations with age and sex

Scales	<i>M</i>	<i>SD</i>	α	age	sex ¹
<i>Temperamental traits</i>					
EPQ-R					
Psychoticism	10.43	4.83	.79	-.42***	-.14
Extraversion	11.98	5.81	.88	-.25**	.22**
Neuroticism	11.85	5.24	.83	-.16*	.18*
Lying	6.52	3.52	.75	.34***	.18*
I.7					
Impulsiveness	6.89	4.10	.80	-.27**	.16*
Venturesomeness	7.87	3.92	.81	-.46***	-.22**
Empathy	13.77	2.94	.67	.05	.13
AIM					
Affect intensity	144.77	21.80	.89	-.28***	.37***
STQ					
STA	13.19	6.41	.84	-.25**	.09
STB	4.69	3.27	.75	-.34***	.03
SSS					
Thrill & Adventure Seeking	6.18	3.49	.82	-.42***	-.14
Disinhibition	5.06	2.83	.71	-.44***	-.18*
Experience Seeking	10.08	4.30	.82	-.45***	-.07
Boredom Susceptibility	4.53	2.47	.66	-.40***	-.17*
Total	25.86	10.66	.91	-.53***	-.16*
PTS					
Strength of Excitation	120.05	17.68	.89	-.07	-.14
Strength of Inhibition	140.57	15.84	.87	.42***	-.14
Mobility	128.40	15.97	.88	-.08	.10
Social Desirability	36.12	4.31	.66	.16*	-.03
DOTS-R					
Activity Level-General	15.52	3.55	.66	-.20*	.03
Activity Level-Sleep	11.43	2.88	.80	.01	.03
Approach-Withdrawal	19.55	3.57	.72	-.30***	.09
Flexibility/Rigidity	15.16	2.72	.68	-.18*	-.03
Mood Quality	21.58	3.93	.81	-.24**	.14
Rhythmicity-Sleep	14.20	4.13	.76	.31***	.04
Rhythmicity-Eating	11.75	3.91	.82	.30***	-.02
Rhythmicity-Daily Habits	11.05	3.16	.67	.35***	-.06
Distractibility (low)	12.04	3.06	.80	.20*	-.11
Persistence	8.35	1.85	.61	.09	.03

<i>Humor-related traits</i>					
SHRQ	55.99	9.15	.75	-.28***	.14
CHS Coping Humor	18.77	3.24	.53	-.01	.06
SHQ					
Metamessage Sensitivity	20.44	2.90	.53	-.08	-.11
Liking of Humor	18.86	3.12	.52	-.12	.09
Emotional Expressiveness	20.12	2.59	.35	-.21**	.05
Total Sense of Humor	59.42	5.94	.62	-.22**	.01
SHQZ					
Humor Appreciation	28.14	6.79	.73	-.16*	.23**
Humor Creativity	26.78	6.22	.66	-.21**	.04
Total Sense of Humor	54.92	11.67	.81	-.19*	.14
TDS					
Seriousmindedness	24.19	4.12	.45	.08	-.20**
Planning Orientation	24.34	4.73	.59	.21**	-.03
Arousal Avoidance	25.35	6.30	.80	.45***	.03
Telic Dominance Total	73.88	11.67	.80	.36***	-.08

Note. ¹ Male sex coded as 1, female sex coded as 2.

Abbreviations: I.7 = Impulsiveness Questionnaire; AIM = Affect Intensity Measure; STQ = Schizotypal Personality Questionnaire; SSS = Sensation Seeking Scale; DOTS-R = Dimensions of Temperament Survey - Revised; SHRQ = Situational Humor Response Questionnaire. CHS = Coping Humor Scale, SHQ = Sense of Humor Questionnaire, SHQZ = Ziv's Sense of Humor Questionnaire, TDS = Telic Dominance Scale.

* p < .05, ** p < .01, *** p < .001.

Table 1 shows that most of the temperamental traits yielded sufficiently high reliabilities. The Alpha coefficients ranged from .61 to .91 (median .80). There was a stronger heterogeneity in the coefficients of the humor scales. While the Cronbach Alpha for TDS SM and SHQ EE were not acceptable, the ones for TDS AA, SHQZ HA, and the SHRQ were satisfying.

Scores in SHRQ, SHQ EE, and SHQZ HA decreased with age, while TDS PO and TDS AA increased with age. Sex differences in the humor traits were rare; females scored higher in SHQZ HA and males higher in TDS SM.

Joint factor analysis of the humor-related and temperamental traits

Do temperament and humor share common dimension? If yes, what is their number and nature? In order to answer these and related questions a principal components analysis was applied to the intercorrelations among the scales of the humor-related and the temperamental inventories. Whereas only three eigenvalues were markedly different from the others, the scree test suggested the extraction of either 3 or 5 factors (Eigenvalues: 9.202, 4.669, 3.392, 2.164, and 1.823). Varimax-rotations of 4 and 5 factors yielded factors which accounted only for a small amount of variance and were neither humor-specific nor representing important temperament factors. Factor 4 was loaded mainly by the three DOTS-R Rhythmicity scales. Factor 5 was loaded positively by the two TDS-scales of Seriousmindedness and Planning Orientation and negatively by PTS Mobility and DOTS-R Flexibility.

Furthermore, the three-factor solution was favored by the fact that the communality of most humor scales approached the square of the reliability. Only two scales still had more than 10 % unexplained variance, TDS SM (11.3 %) and SHQ LH (19.0 %). Thus, there were no more factors needed to account for the variance in the "sense of humor" scales. The three-factor solution accounted for 43.2 % of the variance. The loadings are presented in Table 2.

Table 2. Joint factor analysis of the temperamental and humor-related traits (Varimax loadings)

Variables	Extraversion	Neuroticism	Psychoticism
Age	-.172	-.219	-.593
Sex	.263	.316	-.236
EPQ-R Psychoticism	.013	.057	.734
EPQ-R Extraversion	.703	.021	.231
EPQ-R Neuroticism	-.094	.807	.032
EPQ-R Lying	-.106	-.143	-.498
I.7 Impulsiveness	.458	.288	.386
I.7 Venturesomeness	.377	-.185	.672
I.7 Empathy	.136	.487	-.218
Affect intensity	.439	.605	.027
STQ STA	.110	.586	.235
STQ STB	.060	.605	.414
SSS Thrill & Adventure Seeking	.324	-.199	.595
SSS Disinhibition	.259	.036	.696
SSS Experience Seeking	.377	-.092	.725

17 Temperament, Eysenck's PEN system, and humor-related traits

SSS Boredom Susceptibility	.154	-.037	.702
PTS Strength of Excitation	.436	-.554	.351
PTS Strength of Inhibition	-.218	-.588	-.393
PTS Mobility	.569	-.425	.259
PTS Social Desirability	.276	-.678	-.017
DOTS-R Activity Level-General	.375	.342	.248
DOTS-R Activity Level-Sleep	.055	.135	.098
DOTS-R Approach-Withdrawal	.654	-.134	.351
DOTS-R Flexibility/Rigidity	.231	-.385	.407
DOTS-R Mood Quality	.723	-.074	.048
DOTS-R Rhythmicity-Sleep	.174	-.094	-.556
DOTS-R Rhythmicity-Eating	.063	-.080	-.476
DOTS-R Rhythmicity-Daily Habits	.087	-.184	-.571
DOTS-R Distractibility (low)	.150	-.544	-.315
DOTS-R Persistence	.263	-.152	-.292
SHRQ	.696	-.024	.266
CHS Coping Humor	.593	-.054	-.096
SHQ Meta-Message Sensitivity	.514	-.224	.022
SHQ Liking of Humor	.280	.044	.030
SHQ Emotional Expressiveness	.503	.254	.309
SHQZ Humor Appreciation	.695	.191	-.045
SHQZ Humor Creativity	.693	.125	.033
TDS Seriousmindedness	-.253	-.062	-.134
TDS Planning Orientation	-.292	-.142	-.441
TDS Arousal Avoidance	-.374	.008	-.733

The three factors were easily identifiable as the three Eysenckian superfactors of Extraversion, Neuroticism, and Psychoticism for two reasons. Firstly, EPQ-R-scales E, N, and P were the best markers for the three factors. Secondly, variables known to be markers of the PEN system yielded the expected factor pattern.

Location of the temperament traits in the PEN space

The *Extraversion* factor was loaded by the DOTS-R scales Mood Quality and Approach-Withdrawal, the PTS-scales Strength of Excitation and Mobility, I.7 Impulsiveness, and Affect Intensity. Furthermore, there were minor loadings by SSS Experience Seeking, I.7 Venturesomeness, DOTS-R Activity Level-General, and SSS Thrill and Adventure Seeking.

18 Temperament, Eysenck's PEN system, and humor-related traits

The *Neuroticism* factor was loaded positively by Affect Intensity, Schizotypal and Borderline Personality, I.7 Empathy, and DOTS-R Activity Level-General. There were negative loadings by the PTS-scales Strength of Excitation, Strength of Inhibition, and Mobility, and by the DOTS-R scales (low) Distractibility and Flexibility/Rigidity.

The *Psychoticism* factor was loaded positively by the four Sensation Seeking scales and Venturesomeness, Borderline Personality, DOTS-R Flexibility/Rigidity, PTS Strength of Excitation, I.7 Impulsiveness, and DOTS-R Approach/Withdrawal. There were negative loadings for age, the three DOTS-R Rhythmicity scales, PTS Strength of Inhibition, and DOTS-R (low) Distractibility.

Location of the humor-related traits in the PEN temperament space

Table 2 confirmed the hypotheses that a) Extraversion accounts for most of the variance in the humor related-trait and b) the Psychoticism dimension additionally correlates with *some* of the humor-related traits.

In detail, Extraversion was loaded positively by the sense of humor-scales (i.e., SHQZ HA, SHQZ HC, SHRQ, CHS, SHQ MMS, SHQ EE, and--with a medium-size coefficient--SHQ LH) and negatively by the *telic dominance* scales (i.e., TDS SM, TDS PO, and TDS AA). Psychoticism was loaded positively by the SHRQ and SHQ Emotional Expressiveness and negatively by TDS Planning Orientation and TDS Arousal Avoidance. The loadings on N were minor ones; SHQ MMS loaded negatively and SHQ EE loaded positively on the *Neuroticism* factor.

Thus, the humor-related traits do not form a separate factor but fit well into this three-dimensional space. In fact, only two of the dimensions appeared necessary to account for the major variance in the humor-related traits. The location of the humor-related traits as compared to the P and E factors is given in Figure 1.

19 Temperament, Eysenck's PEN system, and humor-related traits

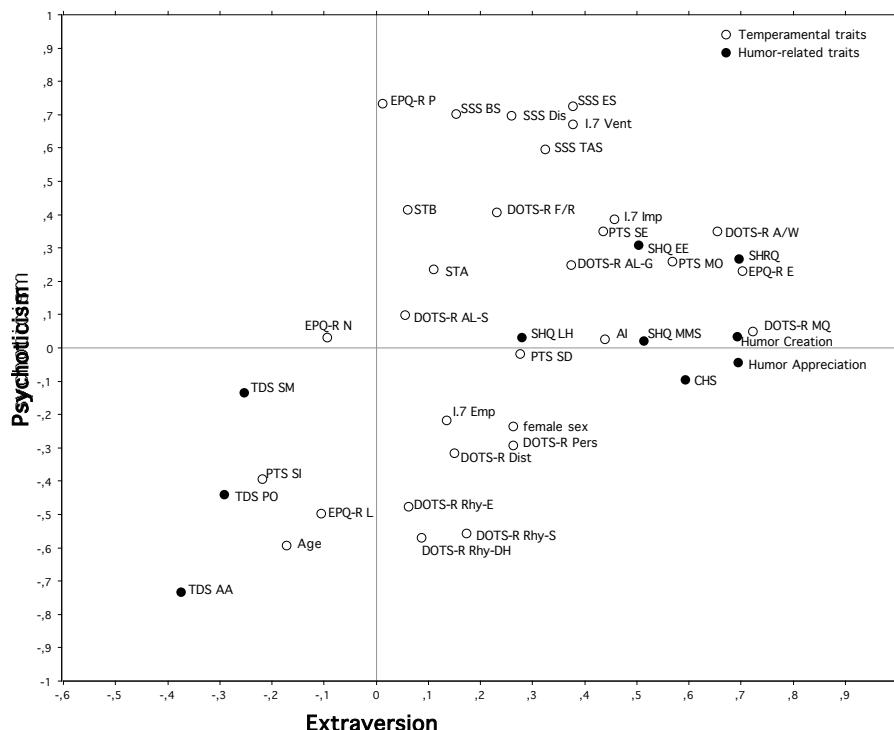


Figure 1. Location of the temperamental and humor-related traits in a space defined by factors of Extraversion and Psychoticism

Figure 1 shows that SHQZ HA, SHQZ HC, CHS, and SHQ MMS were located right on the axis suggesting to be good markers of Extraversion. Interestingly, the SHRQ was located close to DOTS-R Approach/Withdrawal. Both loaded on E and on P and share the element of reacting favorably to new and demanding situations: With approach (DOTS-R A/W) or with laughter (SHRQ). This aspect of a demanding situation is missing in SHQZ Humor Appreciation and DOTS-R Mood Quality. As a consequence, these two scales did not show any alignment with P but were taking adjacent positions on the *Extraversion* axis. Thus, while the general tendency for positive affect and laughter seems to be a characteristic of Extraverts, high P Extraverts also laugh in more demanding situations. Not surprisingly, SHQ Emotional Expressiveness (which contains impulsivity items) was located near I.7 Impulsiveness.

20 Temperament, Eysenck's PEN system, and humor-related traits

Both also load positively on N. Finally, Planning Orientation and TDS Arousal Avoidance are located in the E-P- quadrant.

Internal structure of the humor-related traits

One might argue that the analysis of the humor-related scales in the context of general temperamental traits might not be suitable to detect the more subtle domain-specific differences *among* the tests. In other words, further or more humor-specific factors might emerge from the factoring of only the humor-related scales and these factors might be independent of the PEN-model. This possibility was examined next.

Intercorrelations among the scales

To what extent do the scales overlap in measuring humor? In order to examine their convergent validity the 10 humor-related scales were intercorrelated. The results are given in Table 3.

Table 3. Intercorrelations among the humor-related traits

Humor-trait	SHRQ	CHS	SHQ MMS	SHQ LH	SHQ EE	SHQZ HA	SHQZ HC	TDS SM	TDS PO	TDS AA
SHRQ	1									
CHS	.39***	1								
SHQ MMS	.39***	.38***	1							
SHQ LH	.25***	.16*	.16	1						
SHQ EE	.40***	.26***	.28***	.28***	1					
SHQZ HA	.48***	.45***	.27***	.33***	.41***	1				
SHQZ HC	.49***	.48***	.39***	.24**	.39***	.61***	1			
TDS SM	-.26***	-.11	-.14	-.18*	-.22**	-.09	-.05	1		
TDS PO	-.33***	-.12	-.16*	-.12	-.42***	-.19*	-.13	.52***	1	
TDS AA	-.40***	-.16*	-.18*	-.11	-.34***	-.15*	-.25**	.19**	.43***	1

Note. * P < .05, ** P < .01, *** P < .001.

Table 3 shows that there were essentially two blocks of variables: one consisting of the *sense of humor* scales (i.e., SHRQ, CHS, SHQ MMS, SHQ LH, SHQ EE, SHQZ HA, and SHQZ HC), and one composed of the *telic dominance scales* (i.e., TDS SM, TDS PO, and TDS AA). While these two clusters appeared to be independent, two variables (SHRQ, SHQ EE) provided a link between them. Not surprisingly, these were the ones which also loaded on the P factor (see Figure 1).

Factor analysis of the humor-related scales

A principal components analysis of the 10 scales clearly yielded two factors (Eigenvalues: 3.65, 1.52, .95, .85, and .71) which together explained 52 % of the variance. The unrotated loadings and the Varimax-rotated loadings are given in Table 4. In order to investigate the location of these humor factors in the temperament space their intercorrelations with the EPQ-R scales were computed and are presented in Table 4 as well.

Table 4. The two main factors (unrotated and rotated) underlying the 10 humor-related traits and their relationship to the EPQ-R-scales, age, and sex

Humor scales	Unrotated		Varimax-rotated	
	Factor 1	Factor 2	Factor 1	Factor 2
SHRQ	.76	.01	.65	-.40
CHS	.61	.37	.71	-.01
SHQ MMS	.57	.19	.58	-.14
SHQ LH	.44	.06	.40	-.19
SHQ EE	.68	-.15	.50	-.49
SHQZ HA	.71	.36	.79	-.07
SHQZ HC	.72	.41	.83	-.04
TDS SM	-.39	.64	.01	.75
TDS PO	-.53	.68	-.09	.86
TDS AA	-.52	.39	-.23	.61
Temperament				
P	.25***	.37***	.02	-.45***
E	.52***	-.01	.44***	-.27***
N	-.04	.11	-.09	-.07
L	-.26***	-.30***	-.06	.39***
Age	-.30***	-.16*	-.17*	.29***
Sex	.11	.03	.08	-.09

Note. * P < .05, ** P < .01, *** P < .001.

23 Temperament, Eysenck's PEN system, and humor-related traits

Table 4 shows that all variables loaded on a first unrotated component suggesting a general bipolar factor of low vs. high *sense of humor*. This factor correlated positively with Extraversion and - to a lower extent - also with Psychoticism. However, a second unrotated factor emerged which was *not* instrument-specific and should not be neglected. It was loaded positively by the three TDS-scales *and* some of the sense of humor scales (SHQZ HA, SHQZ HC, CHS). This factor correlated positively with Psychoticism, and negatively with EPQ-R L and age.

The Varimax-rotation yielded a highly plausible and expected pattern. All sense of humor-scales and only they loaded highly positively on the first factor (tentatively labelled *urgency* or *cheerfulness*). As in the joint analysis, the scales of SHQZ Humor Creativity and SHQZ Humor Appreciation yielded the highest and SHQ LH yielded the lowest loadings. There was a highly consistent rank-order of the variables as regards the size of the loading on this factor and the *Extraversion* factor of Table 2 ($r = .92$, $P = .006$). Not surprisingly, the factor scores correlated positively with EPQ-R E but not with N or P (see Table 4).

The second factor (tentatively labelled *restraint* vs. *expressive*) was bipolar. It was loaded negatively by the SHRQ and SHQ EE and positively by the three TDS-scales. There was strong evidence that this factor mainly reflected the influence of (low) Psychoticism in this realm. Firstly, there was a high rank-order of the loadings on this and the P-factor of Table 2 ($r = -.89$; $P = .0075$). Secondly, the factor scores yielded a typical correlational pattern; there were negative correlations with EPQ-R P and positive with EPQ-R L and age. Introversion was involved as well, however.

Discussion

The present study attempted to study both temperament and humor-related traits within the framework of the Eysenckian PEN model of personality. It was hypothesized that the fundamental dimensions underlying temperament are also able to account for habitual individual differences in the domain of humor.

The PEN system and temperament

The joint factor analysis clearly supported the view that the Eysenckian PEN model provides a taxonomic basis for the temperament traits studied. Only three factors needed to be extracted from the present pool of temperament and humor scales and they are interpretable as E, N, and P. Most of the temperament traits yielded factor patterns which were expectable from prior studies with the English versions of these scales.

There were a few anomalies in the loading patterns which should be noted, however. As expected, impulsiveness loaded positively on P, E, and N. However, it was more aligned with E rather than with P. Conversely, both Venturesomeness and Thrill and Adventure Seeking loaded positively on E and P, but more highly so with P than with E. This might be partly due to the fact that the Psychoticism axis was shifted slightly towards Extraversion⁴. Variables located in the P+E+ diagonal (all SS scales, I.7 Vent, DOTS-R A/W) are overrepresented in the present study and might have forced this location of the axes⁵. Similarly, it should be kept in mind that the many sense of humor scales yielded an overrepresentation of the surgency component in the present Extraversion factor.

The present study also provided information regarding the relationship between the DOTS-R scales and Psychoticism. While the pattern of loadings of the DOTS-R scales on the E and N factors were remarkably similar to the results found in the study by Windle (1989), the present study showed that P can account for parts of the variation in the DOTS-scales, too. Psychoticism was loaded positively by Approach/Withdrawal and Flexibility/Rigidity and negatively by the three Rhythmicity-scales. The location of Rhythmicity in the P dimension of the PEN system is a noteworthy finding, since Rhythmicity can not be accounted for by the 5-factor model (Angleitner and Ostendorf 1994).

The PEN system and humor-related traits

As regards the humor-related traits, the results of the present study confirmed the basic assumption that certain facets of the sense of humor-construct can be discussed within the realm of temperament. As a matter of fact, most of the reliable variance of the humor inventories studied could be accounted for by the two general temperament dimensions of Extraversion

and Psychoticism. More than that, it appears that only one dimension, namely Extraversion/Introversion, is needed for the location of the present sense of humor-scales (at least for the ones in the more narrow sense).

Extraversion/Introversion

The Extraverts' greater (as compared to Introverts) susceptibility for positive affect, smiling and laughter, enjoyment of entertaining others, carefreeness, and their lower degree of seriousness predispose them for higher scores in sense of humor-questionnaires emphasizing these characteristics. Thus, those facets of the sense of humor as measured by the scales of Humor Appreciation, Humor Creation, Coping Humor, Metamessage Sensitivity, and the SHRQ can be subsumed under Extraversion.

These results fall in line with prior studies of Extraversion and questionnaire measures of "sense of humor," which, however, were lacking an explicit rationale. A scale of *self perception of sense of humor* (covering aspects like entertaining others, being amused easily, laughing often) was positively correlated ($r = .44$) with Extraversion in a sample of 110 Austrian adults (Ruch and Hehl 1985). Also Deaner and McConatha (1993) found positive correlations between Extraversion and the SHRQ, CHS, and SHQ MMS. Thorson and Powell (1993b) found positive correlations between a questionnaire measure of humor creativity and exhibition and dominance (which can be regarded as markers of Extraversion).

Psychoticism

While E was sufficient for the sense of humor scales in the narrow sense, P was needed additionally to account for the other humor-related scales. The tendency to freely express one's emotions (SHQ EE) loaded positively on P (and also slightly so on N) and the tendencies to plan ahead (TDS PO) and to avoid arousal (TDS AA) went along with low Psychoticism. These relationships can be predicted from the concept of Psychoticism. One has to bear in mind, however, that these scales were not considered to be sense of humor-scales in the narrow sense.

Nevertheless, Psychoticism is relevant for the study of humor. The results of the present study suggest that P relates to individual differences in the degree to which an individual is prepared for a humor-related stimulus or

not. The low P scorer seems to be prone to protect himself from such stimulation, especially when it is intense or unconventional while the high scorer does not. While the E-dimension determines the threshold of the positive affective response to a humor stimulus (covert amusement, smiling, or laughter), the P-dimension might relate to the ease or difficulty with which a humor-related stimulus gains attention and is processed adequately, i.e., in a playful frame of mind. This hypothesis is in line with the finding that only those SHRQ-items which depict situations which are of different relevance for the high and low P-scoring correlated with E and P (Ruch and Deckers 1993). Also, in the present study DOTS-R MQ (which also assesses the frequency of smiling and laughter without specifying situations) loaded only on the Extraversion factor and it correlated highly with the *surgency* factor ($r = .61$; $P < .0001$) while its correlation with the second factor was negligible ($r = -.17$, $P < .05$).

Neuroticism

Neuroticism was not involved in the prediction of the humor-related traits studied in the present sample as it was not in the prior study by Ruch and Hehl (1985)⁶. Only CHS⁷ ($r = -.19$, $P < .05$) and SHQ MMS ($r = -.23$, $P < .01$) had significant zero-order correlations. However, N might relate to the aspects of losing ones sense of humor under stressful conditions (as exemplified in *some* CHS items), or being habitually predominantly ill-humored or sad. Such facets, however, were not included in the questionnaires studied.

Sense of humor: Surgency and seriousness?

What are the dimensions underlying sense of humor? The analysis of the internal structure of the humor-related traits employed in the present study suggested that they are quite redundant, i.e., the questionnaires primarily varied along only two dimensions. Thus, there is an overdifferentiation of certain aspects and differently labelled questionnaires in fact measure highly similar traits. While the low to medium sized intercorrelations among the relevant scales seem to suggest a relative independence of these traits, the low reliabilities do not allow such a conclusion.

The more important of these two dimensions is composed of scales located on the E-axis (CHS, SHQ MMS, SHQZ HA, SHQZ HC) and can be regarded as representing the well-known *surgency* subfactor of Extraversion (see also Cattell's 16PF-F scale). A more domain specific label for this factor would be *cheerfulness*.

The second factor was more heterogeneous and bipolar. This factor of *restraint vs. expressive* (tentative label) resembles general temperament factors as well. It was loaded positively by the three TDS-scales and negatively by the SHRQ and SHQ EE. The concept of *telic dominance* (Apter 1982) and Raskin's (in press) conceptualization of seriousmindedness may serve for a theoretical underpinning of this factor.

While the two factors were rotated orthogonally they might well be slightly negatively correlated. However, despite the fact that all TDS-scales loaded negatively on the first *unrotated* factor, the results do not support an unidimensional concept, such as a bipolar dimension ranging from serious to cheerful/humorous. First, the loadings of the TDS-scales are too low, and secondly, the arousal avoidance and planning orientation subscales have a marked loading on the second factor, too. The crucial issue - the location of seriousmindedness in this space - could not be achieved because of the low reliability of the scale. So far, however, seriousmindedness does not appear to form the opposite pole of the humor dimension which relates to the likelihood of laughter. Thus, it is not surprising that Svebak and Apter (1987) did not find a relationship between TDS SM and the frequency of laughter.

Other studies provided further evidence that the humor scales investigated in the present study indeed are of a low dimensionality. Also Korotkov (1991) extracted only two factors (interpreted as *Beliefs about Humor in Self vs Others* and *Laughter Responsiveness*) from a highly similar set of 7 humor scales (SHRQ, CHS, SHQ and measures of Humor Initiation and Humor Responsiveness). Interestingly, the two scales relating to E and P (SHRQ and SHQ EE) were the best markers for the second factor. Item factor analyses performed for some of these inventories suggested more factors, however (Thorson and Powell 1991). Analyses of the item sets of the SHQ, SHRQ, and the CHS yielded 6, 5, and 2 factors, respectively. A joint factor analysis of all 49 items yielded 15 factors⁸.

A different set of humor items again favored a low number of dimensions. While factor analyses of sets of 80 and 53 sense of humor items yielded 7 components (Ruch 1980), the most basic of the derived scales (*self-perceived sense of humor*) combined all those aspects which

were also covered by the present humor scales⁹. Finally, the aspects of humor production and social uses of humor gave rise to the major factor underlying the item pool of the *Multidimensional Sense of Humor Scale* (Thorson and Powell 1993a)¹⁰. Thus, surgency or cheerfulness as an element of the sense of humor has been verified before repeatedly.

However, one has to bear in mind that while the inventories studied did overrepresent certain aspects of humor, some domains were not covered well or not at all. Undoubtedly there are several elements of humor which are orthogonal to the factors studied here. Appreciation of humor (as measured by the 3 WD humor test) is such an example. The 3 WD humor test (Ruch, 1992) does not correlate with the SHRQ (Deckers and Ruch 1992), nor with self perceived sense of humor (Ruch and Hehl 1985) or Extraversion (Ruch 1992).

The discussion of the dimensionality of the sense of humor-construct deserves a more thorough discussion than can be undertaken here. The present study can not contribute to the question of the number and nature of the components of the sense of humor since only a few segments of humor were represented in the questionnaires studied. However, for the segments analyzed it can be claimed that the 10 inventories studied can be reduced to two dimensions without much loss of information.

Are Introverts really lacking a sense of humor?

The current sense of humor questionnaires do seem to suggest that Introverts are lacking a sense of humor. Quiet, less talkative people will all score low in these questionnaires. However, there are many well known introverted humorists. How to explain this discrepancy? First of all, one has to bear in mind that the questionnaires studied do cover *some* but not *all* aspects of humor. As already stated, aspects such as susceptibility to positive emotions or the enjoyment of entertaining others are most strongly represented. There are definitions of sense of humor which do not emphasize these aspects at all. For example, sense of humor was conceptualized to be "the attitude of not taking oneself too seriously" or "a cheerful composed frame of mind in the midst of the adversities and insufficiencies of life" (Ruch 1993). In this view, a low threshold for laughter would not indicate a sense of humor. Rather, it would depict a person being very immature. Other aspects, such as the (nonsocial) creation of humor, might also be independent from Extraversion. There is evidence

that individuals who are creative in general produce funnier captions when asked to complete humorous stories. Thus, Introverts, if they are creative, might have an elaborated sense of humor.

The crucial question is, however, whether there are areas of humor-related behavior where Introverts outperform the Extraverts. In other words: is there a typical sense of humor of Introverts? There are more quiet, non-social, deeper-going and subtle forms of humor which might suit the Introvert better than the Extravert (see Eysenck 1942, who found a .61 correlation between social shyness and a complexity factor in jokes). The question whether they will produce these forms of humor more readily or actually *laugh* at them more often than Extraverts is open for empirical investigation.

A brief appraisal of the humor-related scales

This report is not aimed at a comprehensive discussion of the sense of humor scales. However, the results of the present study allowed to draw several conclusions for the humor-related scales (at least for their German versions).

In general, the internal consistency of the German translations of the humor-related scales is lower than the ones for the temperamental scales. This is surprising since they are supposed to measure more narrow traits. The internal consistency of the SHQ Emotional Expressiveness and TDS Seriousmindedness scales is not acceptable. The low internal consistency was also found for the English version of the SHQ EE (Lefcourt and Martin 1986).

The scales of Humor Appreciation and Humor Creativity are not *orthogonal* (Ziv 1984: 111) but highly positively intercorrelated. This might be due to the fact that some of the items of both scales do not match the definition of the scales (i.e., they lack *content validity*). If orthogonality between the two concepts is of theoretical importance, these scales need a revision. However, both scales are very good markers of surgency and Extraversion.

Liking of humor (SHQ LH) is the scale containing the highest portion of variance that is independent of the PEN system. Also the recent study by Deaner and McConatha (1993) did find a positive but nonsignificant correlation between Extraversion and SHQ LH. This is not surprising since studies of humor appreciation and personality show that the PEN system is

of little importance in the prediction of responses to cartoons and jokes (Ruch 1992). Likewise, the SHRQ does not correlate with appreciation of humor (Deckers and Ruch 1992). Individual differences in this realm appear to be more highly related to attitudes and values (Ruch 1992). However, humor appreciation is not unidimensional itself. Thus, it would be of interest to investigate whether there are positive correlations between the questionnaire measure of liking of humor (SHQ LH) and behavioral measures of humor appreciation.

Murgatroyd et al. (1978) did not find relationships between *telic dominance* and the Eysenckian personality system. This might be due to the fact that their study did not include the P-dimension and employed only a short scale of E which is of course less reliable than a full scale. Thus, the results of the present study allowed to locate *telic dominance* in the P-E-quadrant.

Other personality dimensions needed for the location of the sense of humor?

There are alternative systems of personality description, such as the models by Guilford, Cattell, or the five factor model (Costa and McCrae 1985). They might serve as frame of reference as well. Also the latter model (alternatively called the "big five" or the "Norman five") of personality contains factors of Extraversion (or Surgency) and Neuroticism (or Emotionality, Emotional Stability) which are considered to be equivalent with the Eysenckian superfactors E and N. The remaining three factors are Conscientiousness (or Will to Achieve), Agreeableness, and Openness (or Culture, Intellect). The former two define the negative pole of Psychoticism.

These personality dimensions may be relevant for humor as well. Agreeableness (or low P) might relate to the warmth, philanthropic aspect of some conceptualizations of the "sense of humor." This aspect, however, was missing in the present inventories studied. Conscientiousness might be needed (like low P, but not Agreeableness) for the location of seriousmindedness. The role of Openness to Experience can be seen in the appreciation of *structural* properties of humor stimuli, such as jokes or cartoons. While incongruity is a necessary ingredient in all kinds of humor, jokes and cartoons differ with respect to whether the incongruity is fully resolvable or not, how complex they are etc. Such differences in humor

structure preference might be accounted for by Openness. Indeed, Openness correlated positively with appreciation of nonsense (i.e., incongruity) based humor and negatively with incongruity-resolution based humor (Ruch, unpublished data). These findings are in line with the results found for correlates of Openness, Conservatism (low O) and Experience Seeking (high O) (for a review of studies relating to appreciation of structure and content in humor, see Ruch 1992).

There are still other domains of humor-related behavior left, such as the *comprehension* or *creation* of humor. Like appreciation of humor stimuli, these aspects will be located outside the PEN space. There is no doubt that they will touch the domain of ability, e.g., general intelligence, verbal intelligence, or creativity (see reviews by Feingold and Mazzella 1991; O'Quin and Derk 1997, Ruch 1980).

All in all, we are only beginning to understand the multidimensional nature of the sense of humor-construct. What is needed is the precise identification and definition of all the facets, the construction of psychometrically sound measurement instruments, and studies identifying the interrelations among them as well as their location in general models of personality.

Author notes

This paper is based on data presented at the first workshop of the European Association of Personality Psychology (EAPP) on *Cross-Cultural Research on Temperament*, Nieborow, Poland, Sept 1991 and the *Eleventh International Conference on Humour and Laughter*, Luxembourg, Sept 29 - Oct 3, 1993. The preparation of this manuscript was facilitated by a Heisenberg grant (Ru 480/1-1) from the German Research Council (DFG) to the author. Correspondence and requests for reprints should be addressed to Willibald Ruch, Department of Physiological Psychology, Heinrich-Heine-University of Düsseldorf, Universitätsstraße 1, 40225 Düsseldorf, Germany.

Footnotes

¹ Despite the fact that the phenomenon of coping with humor is not established very well at the *behavioral* level there already exist three scales to measure it at the *habitual* level.

32 To be in good or bad humour

- 2 While the present author does not share the view that the term "sense of humor" is appropriate in all cases, this expression will be used in accordance with the authors of the respective questionnaires.
- 3 Strictly speaking, TDS PO and TDS AA (but also SHQ EE) can not be regarded as humor scales but represent general temperament dimensions. Although these characteristics are relevant for humor, the content of these scales does not genuinely reflect humor-related behavior. Thus, while TDS SM will be counted as belonging to the list of humor scales in the *narrow* sense, TDS PO, TDS AA, and SHQ EE will not. Nevertheless, these constructs represent theories developed in the context of humor research and they were also used in the prediction of humor-induced laughter (e.g., Svebak and Apter 1987). Hence, they are still listed under the humor-related scales (i.e., in the broader sense) rather than put to the temperament traits.
- 4 As an effect, EPQ-R E had a slight positive loading on the P-axis.
- 5 The accumulation of scales located in the P+E+ quadrant in the studies by Zuckerman, Kuhlman, Thorquist, and Kiers (1991) and Zuckerman, Kuhlman, and Camac (1988) might have been responsible for the appearance of a strong factor of P-Impulsive-Unsocialized Sensation Seeking (P-ImpUSS) which was loaded by P, but also, to a lower extent, by E.
- 6 Deaner and McConatha (1993) found also negative correlations between Neuroticism and the humor scales (including SHQ LH). However, this might reflect the fact that E and N were negatively correlated (instead of being orthogonal) in their sample rather than indicating an involvement of N in the prediction of the selected list of humor scales.
- 7 Zillmann, Rockwell, Schweitzer, and Sundar (1993) did not find their measure of coping humor to be correlated with Neuroticism.
- 8 Thorson and Powell (1991) may have largely overestimated the number of meaningful factors derivable from these scales. An analysis of the present data performed under conditions comparable to theirs (principal components analysis, Eigenvalue greater than 1, Varimax-rotation) yielded 8, 8, and 2 factors for the SHQ, SHRQ, and CHS items sets, respectively. The scree test, however, suggested the retention of only 3, 2, and 2 factors, respectively. While there were 18 eigenvalues in excess of unity for the total item pool (15 in the Thorson and Powell study), the root curve suggested the extraction of only three factors (which were *not* instrument-specific). The eigenvalue greater one rule can clearly not be recommended for principal components analyses (which does not estimate communalities and thus carries variance due to specific factors). Furthermore, while an extraction of a larger number of factors may make sense, it is unlikely that they will be orthogonal.
- 9 The other factors related, for example, to appreciation of sexual, aggressive, complex vs. simple, and nonsense forms of humor. These self-evaluation scales, however, correlated with the actual performance rather low (albeit significantly so), and hence the questionnaire-approach to these phenomena was discarded. For example, self-reported appreciation of sexual humor correlated .45 ($P < .001$) with rated funniness of sexual humor. The respective coefficient for nonsense humor was .26 ($P < .01$).

- ¹⁰ Thorson and Powell (1993a, 1993b) do not provide the eigenvalues and the factor pattern for the *unrotated* solutions. Hence it can not be evaluated whether there *is* a general factor underlying all items or not. The fact that their four orthogonally rotated factors are combined to form *one* total score supports the assumption of such a general factor combining several aspects of humor, such as production or coping

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