

**A theory of personality traits leads to
a genetic model for borderline types
and schizophrenia**

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Summary in plain English

We present here an original theory of human personality traits based on traditional genetics. We identify three separate traits, each being dependent on the expression of a single gene. We call the traits "behavioral complexes" because each trait expresses itself in a spectrum of related behavioral characteristics. The three traits are: aggression (A), narcissism (N) and perfectionism (P). The traits of aggression and narcissism are fundamental to the human personality structure, and each is associated with a rage reaction: the well-known aggressive-vindictive rage ("flight or fight" reaction), and the not so well-known narcissistic rage ("tantrum of vanity"). The trait of perfectionism is well-known in the context of "obsessive-compulsive" behavior. The latter trait is present in some personality types as a modifier trait, but it is not essential to human social behavior.

The resulting model based on only the traits N, P and A appears at first sight overly simple. However, it is complex enough to generate all of the classic personality disorders of the psychiatric literature.

The traits N and A are special, in that a functioning individual must have at least one of the two traits underlying his/her personality structure. Individuals who have only one of the traits (N or A) are particularly vulnerable in the context of schizophrenia. That is, if the single trait that the individual possesses is not allowed to flourish, for example because of environmental constraints, then the individual will be incapacitated in social relations. In a *schizophrenic type* the single trait is profoundly suppressed so that the individual has symptoms of psychosis (delusions and hallucinations). In a *borderline type* the trait is partially suppressed so that the individual is schizoid or withdrawn (but not psychotic), yet is still identified as having difficulties in interpersonal relations.

Our approach leads to a model of schizophrenia based on two separate genetic loci (corresponding to the traits N and A), with three variants of each gene (alleles) at each locus. We have found some evidence that the gene for the trait of aggression is linked to a well-known gene (HLA) on chromosome 6.

We note that our model predicts that schizophrenia is a heterogeneous entity, being composed of several distinct types. It predicts that the genetic structure underlying schizophrenia is not distinct "abnormal genes", "genetic defects", or "inborn errors of metabolism". Rather, the basis of schizophrenia is very frequently-occurring genes that are present in many "normal" personality types, but happen to occur in an unfavorable combination in the schizophrenic or borderline individual. Our approach is consistent with a so-called "diathesis-stress" model in which clinically evident schizophrenia is triggered by environmental stresses imposed on a genetically vulnerable individual.

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Summary

A genetic model of basic personality traits is presented, proposing three "behavioural complexes", or traits, which are the expression of major pleiotropic genes. The traits are: aggression, narcissism and perfectionism. The traits of aggression and narcissism represent the dual nature of human ambition, and each is associated with a rage reaction. The trait of perfectionism is associated with obsessive-compulsive behaviour. The resulting model is parsimonious in that it generates all of the classic personality disorders and borderline types of the psychiatric literature. The genetic predisposition to schizophrenia lies in lack of expression of the traits of aggression and narcissism, leading to a model of two loci, with three alleles at each locus. The gene for the trait of aggression may be linked to the HLA loci. The model proposes that schizophrenia is a heterogeneous entity, being composed of several distinct types. It is suggested that diathesis-stress models of schizophrenia based on the lack of expression of natural character traits are worthy of further exploration.

Introduction

Although the domains of psychology and psychiatry have flourished during the twentieth century, no objectively testable model of the human personality has been advanced. Indeed, since the time of Freud, the approaches to personality have been qualitative, or at best empirical, in nature [1-9]. The lack of prior success in the adequate identification of basic character traits, and their origins, indicates that new approaches to this question are necessary.

Model based on three genetic character traits

Genetics and environment

Although it is universally accepted that both genetic and environmental factors comprise personality, no model based on the combined action of these factors has been put forward. To begin, we make the assumption that although

both factors are operative, it is -- based on studies with identical twins [10] -- clearly the genetic, or structural, factors that first need to be identified.

Traits of aggression, narcissism and perfectionism

Horney [11] advanced the concept that at maturity there exist at least three expansive character types, namely the "arrogant-vindictive", the "narcissistic" and the "perfectionistic". Extending these ideas, we posit that the human character rests primarily on the existence of three major traits: aggression (A), narcissism (N) and perfectionism (P). Each of these traits is assumed to exist as a "behavioural complex", being the expression of a single major pleiotropic gene (a gene determining several related characteristics). Our interpretation of the three traits is as follows:

Aggression (A): The behavioural trait of aggression is observed to be the most labile of the three. The stereotypic acts associated with this trait involve body posturing, gestures, and eye contact of intimidation and deference, with individuals having this trait continually competing with each other on a scale of dominance and submission. The trait of aggression corresponds to a striving for power over one's environment, hence it is one main component of competitiveness or ambition. In a pejorative connotation the trait may reveal itself in the context of sadism or sadomasochism. The facial expression is non-sanguine, i.e., tending toward sallowness or pallor in individuals of light skin colour. The hallmark of the trait of aggression is a mass discharge of the sympathetic nervous system: the "flight or fight" response or the aggressive-vindictive rage. During the expression of this rage, the facial complexion of pallor is accentuated.

Narcissism (N): The trait of narcissism is noted to be less labile than that of aggression (where individuals may be constantly altering their character states on a scale of dominance and submission). The stereotypic acts associated with the trait include self-flaunting body posturing, expansive arm gestures, bowing, instinctive self-adornment, and a natural attraction to the limelight of personal recognition. Individuals having only this trait (of the three) are competitive but non-aggressive in their strivings for recognition. The trait corresponds to a striving for glory in one's environment, hence it is the second main component of human ambition. In a pejorative connotation, the unbridled trait of narcissism may reveal itself in the context of conceit, exhibitionism, vanity or messianism. An associated facial expression includes the radiant gingival smile (broadly exposing gums and teeth). The facial complexion tends toward blood-red or ruddy. Hallmarks of the trait include blushing, flushing, and a second type of mass discharge of the autonomic (parasympathetic) nervous system: the narcissistic rage of defence and withdrawal. During expression of this rage the normally sanguine complexion becomes even more florid.

Perfectionism (P): The trait of perfectionism is not a basic drive of ambition and is not associated with a rage reaction. Rather it is a mediator of the unbridled drives of aggression and/or narcissism. The stereotypic acts associated with the trait of perfectionism are obsessiveness, compulsiveness, repetition, and the maintenance of neatness, order and symmetry. A clue to the nature of the trait lies in the compulsive, repetitive mannerisms of autistic children and some adult schizophrenic individuals [12-14]. The behavioural pattern is often ritualistic and the speech characterised by echolalia. It will be posited later that certain autistic and schizophrenic individuals are those in whom the two components of ambition, i.e. aggression and narcissism, have been suppressed by genetic or environmental factors, either congenitally, in childhood, or after maturity, thus revealing in the individual a primitive state of perfectionism.

Origin of the character traits

The most vigorous proponent for the traits A, N and P in interpersonal behaviour was Horney [11,15-20], who considered that the traits have environmental origins, being the result of an individual's desperate search for dominance in the context of a stifling upbringing. The present model -- in ascribing the traits to genetic origins -- emphasises even more the physiognomic attributes that tend to exist concurrently with the behavioural ones. Thus, when divorced from the trait of narcissism, the trait of aggression is found to be associated with a non-sanguine complexion, with an incapacity to express the warm smile of recognition, and with the non-florid aggressive-vindictive rage. In contrast, the trait of narcissism is associated with a sanguine complexion, the radiant gingival smile, and the florid narcissistic rage.

Aggression: complete and incomplete expression (Dominant, Submissive and Resigned types)

We now introduce a category of basic states of personality, or character vectors, which take into account the quality and degree of expression of the trait of aggression, A. Again, extending the views of Horney [11], three character vectors are defined, namely dominance, submission and resignation. We use the term "vector" because dominant character types tend to project themselves above other individuals, submissive types tend to place themselves beneath others, and resigned types tend to retreat away from others.

1) Dominance: Dominant character types

In the character vector of dominance, the traits A and N, if present at all, are fully expressed. Therefore, allowing for the various combinations of the traits N, P, and A, we obtain the following dominant character types:

Narcissistic (N)

Aggressive (A)

Narcissistic-aggressive (NA)

Narcissistic-perfectionistic (NP)

Perfectionistic-aggressive (PA)

Narcissistic-perfectionistic-aggressive (NPA).

These phenotypes are summarised below. They are also listed in Table 1, together with the corresponding personality states that have been described in the literature. Note that an ambitionless, pure perfectionist (P) phenotype does not exist as a dominant character type.

Narcissistic (N) type:

The narcissistic (N) type is found in the writings of Horney [11,15] and others (Table 1). In our view, this is the equivalent of the "sanguine" character type described by the ancients. The important attributes of this type are: expansiveness but unaggressiveness, non-perfectionism, a tendency to flamboyant self-adornment, a natural attraction to the limelight, the gingival smile of recognition, and the florid narcissistic rage. In extreme forms this type appears as a self-anointed visionary, a proselytising evangelist or a messianic personality.

Aggressive (A) type:

The aggressive (A) type corresponds to Horney's arrogant-vindictive type [11] and to her concept of "moving against people [16,17]. In our interpretation, this is the classic "choleric" character type of antiquity. The main attributes of this type are: unbridled arrogance, instinctual vindictiveness, non-perfectionism, no tendency to self-adornment, a wry or sardonic grin in place of a gingival smile, and the pallid-complexioned aggressive-vindictive rage. In extreme forms this type appears as a sadistic personality, as an extroverted paranoid personality, or as the so-called antisocial or sociopathic personality.

Narcissistic-aggressive (NA) type:

The narcissistic-aggressive (NA) type may be regarded as a composite of the previously described narcissistic and aggressive types. Horney described the essence of this character type, in the female, in an article, "The overvaluation of love: a study of a common present day type" [18]. The main attributes of this type are: a sanguine complexion, synergistic merging of unbridled narcissism

and aggression, hyperactivity, non-perfectionism, a tendency toward extreme self-adornment, exhibitionism in the limelight, a "flashy" extroverted smile, a tendency toward hypersexuality, and the capacity to exhibit the narcissistic, aggressive-vindictive or combined narcissistic-aggressive rages. In extreme forms this character type appears as the hypomanic, histrionic or hysterical personality.

Narcissistic-perfectionist (NP) type:

The attributes of the narcissistic-perfectionist (NP) type were described by Horney [11] in her exposition of the "perfectionist type". In our view, this encompasses the classic "phlegmatic" type known to the ancients. The main qualities of this type are: a tendency toward a sanguine complexion, industriousness, orderliness, an intense sense of duty, unaggressiveness, stubbornness, negativism, a tendency to ruminate, perfectionistic rather than unbridled self-adornment, an uncommonly seen gingival smile of recognition, and the capacity to exhibit the florid narcissistic rage. In extreme forms this character appears as the obsessive-compulsive personality.

Perfectionist-aggressive (PA) type:

The perfectionistic-aggressive (PA) type is alluded to by Horney [16] in her mention of aggressive types who function in the capacity of a "power behind the throne", that is, personages who utilise intellectual qualities and planning rather than overt aggression to achieve their aims. In our view, this is the classic non-sanguine, austere "melancholic" personality of the ancients. The principal qualities of this type are: a non-sanguine complexion, passive aggressiveness, dour perfectionism, vigilance, manipulativeness, a proud bearing, haughty reservedness, a calculated vindictiveness, a lack of an innate tendency to self-adornment, a sardonic grin, and the pallid-complexioned aggressive-vindictive rage. In extreme forms this is the passive-aggressive, rebellious-distrustful, or ruminating paranoid personality.

Narcissistic-perfectionist-aggressive (NPA) type:

The narcissistic-perfectionistic-aggressive (NPA) type was not explicitly described by Horney, although she did note [11,15] that the three traits can coexist in the same individual. The main attributes of this type are: a sanguine complexion, a loud voice, dynamism with a tendency to be overbearing, bombastic garrulity, intense eye contact, a strong sense of duty, a bent toward conventional values, unpretentious self-adornment, an outgoing smile of moderate intensity, and the capacity to exhibit the narcissistic, aggressive, or explosive narcissistic-aggressive rages. In the extreme cases this individual is the managerial-autocratic or explosive personality.

2) Submission: Submissive types, including Borderline and Schizophrenic types

In the character vector of submission the trait of aggression is not fully expressed. We define two gradations of submission: <>non-compliance<>, in which the individual is basically submissive but is easily activated to an energetic state of aggression, and <>compliance<>, in which the individual tends to remain in a profound state of submission.

The state of submission is most often the result of a congenital, inherited, incomplete expression of the gene for the trait A. It may also be induced during the juvenile period on the basis of environmental constraints to character development. That is, phenocopies (based on environmental factors) of a genetically disposed submissive state may exist. Also, like dominant types having full expression of the trait A, submissive types may exhibit the aggressive-vindictive rage. However, the threshold for the triggering of such a rage may be higher.

Non-compliant submissive types -- We denote the state of non-compliance by A- obtaining the following phenotypes:

Aggressive borderline (A-)

Perfectionistic-aggressive borderline (PA-)

Narcissistic non-compliant (NA-)

Narcissistic-perfectionistic non-compliant (NPA-)

Compliant submissive types -- We denote the state of compliance by A=, obtaining the following phenotypes:

Aggressive schizophrenic (A=)

Perfectionistic-aggressive schizophrenic (PA=)

Narcissistic compliant (NA=)

Narcissistic-perfectionistic compliant (NPA=)

The NPA- non-compliant type corresponds to active, motivated, non-confrontational individuals whose baseline personality tends toward submissiveness, as described by Horney in her discussion of inverted sadistic behaviour [17]. In the therapeutic setting, these individuals are found over the spectrum of "type A", dependent, and phobic-anxious personalities (Table 1). The NA- type is a non-perfectionistic, active individual exhibiting pronounced

narcissistic behaviour. In the therapeutic setting this is a cyclothymic or dependent histrionic personality (Table 1).

The compliant types NA= and NPA= correspond to more profoundly submissive individuals, having more pronounced tendencies toward masochistic behaviour (Table 1). They correspond to Horney's compliant "self-effacing" personality [11] and to her concept of "moving toward people"[19].

Since the above-mentioned non-compliant types possess the trait N, they tend to have sanguine complexions. Among the remaining types, we note categories of non-sanguine, potentially aggressive borderline types (A- and PA-) and schizophrenics (A= and PA= types).

By definition, the borderline types possess only one of the traits of ambition (N or A) and it is only partially expressed; the schizophrenic types have only one of the traits, and it is profoundly suppressed.

3) Resignation: Resigned types, including Schizophrenic types

In the character vector of avoidance, or resignation, the trait of aggression is stunted after maturity because of environmental constraints. Unlike submissive types who readily involve themselves in the relative competition of dominance and submission (and sometimes sadomasochism), resigned types remain relatively detached from such activities and only with difficulty can be stressed to an energetic state of aggression. However, like submissive types, resigned types can be induced into the aggressive-vindictive rage.

Denoting the state of resignation by -A, we obtain the following resigned types:

Aggressive schizophrenic (-A)

Perfectionistic-aggressive schizophrenic (P-A)

Narcissistic resigned (N-A)

Narcissistic-perfectionistic resigned (NP-A)

The resigned types having the narcissistic trait correspond to detached individuals, as described by Horney [11]. She considered that "moving away from people"[20] was a maladaptive response that could develop as a growing individual struggled toward maturity. The NP-A type tends to have strong perfectionistic tendencies, while the N-A type is more labile (Table 1).

Again, the above resigned types tend to have sanguine complexions. Among the remaining types, we note once more a category of non-sanguine,

potentially aggressive schizophrenics. Here, however, the attainment of state -A or P-A represents a dramatic "schizophrenic break" after maturity from a premorbid state of dominance (A or PA).

Narcissism: incomplete expression (non-aggressive Withdrawn types)

We focus on the dominant types N and NP, who lack the trait A. In analogy with the previous discussion of the partial expression of the trait A, we define the following states of incomplete expression of the trait N, as shown in Table 1: N-N=, and -N-. Again, these states may be rooted either in heredity or in environmental constraints.

In summary: Our analysis, presented in detail elsewhere [21] shows that the model predicts two major categories of schizophrenia, namely 1) that in which the trait A is genetically absent and the trait N is suppressed, and 2) that in which the trait N is genetically absent and the trait A is suppressed.

Thus, our model leads to an analysis of a character structure that exists when naturally-existing character traits are only marginally expressed. This generates a diathesis-stress model for schizophrenia, i.e. incorporating aspects of both genetics and environment.

Discussion: Genetics of character traits

On the basis of archetypal examples, the model assumes that in their full expression the traits A and N are transmitted according to autosomal recessive inheritance, with the trait P being transmitted in the autosomal dominant mode. For the traits A and N, we assume the existence of three alleles, corresponding to full expression, partial suppression, and total suppression of the traits. Thus, for trait A these alleles are denoted by **a**, **a-** and **a~**, respectively, and the corresponding alleles for the trait N are **n**, **n-** and **n~**. For the trait P, we postulate two alleles, **p** and **p~**, corresponding to full expression or total absence of the trait P, on the assumption that the trait is always transmitted with complete penetrance.

We propose that the alleles **a~** and **n~** control the production of inhibitors of the traits A and N at the level of the central nervous system, and the alleles **a-** and **n-** produce partial inhibition. Thus, we are led to posit that the alleles **a~** and **n~** are dominant, alleles **a** and **n** are recessive, with alleles **a-** and **n-** occupying intermediate positions (Table 2).

A result of autosomal recessive inheritance for the traits A and N is that only matings of individuals of the A or PA category with those of the N or NP category could produce "ambitionless" progeny, totally lacking both the N and A traits. Such an event would be lethal to the offspring, or if the offspring did

survive intra-uterine life, they would be placed in the "failure to thrive" category (partial or complete infertility)..

The present model does not mean that all individuals can be readily stereotyped by simple caricatures, as depicted in Table 1. First of all, besides the three posited genes, many other "modifier" genes very likely influence personality. In particular, human temperament in the Pavlovian sense -- a measure of an individual's level of activity, or excitability -- probably has a genetic basis [1,6,8]. Thus, for each character type we allow for the possibility of a spectrum of temperaments having a genetic basis. Secondly, environmental influences are posited to play an important role, the model being not inconsistent with the concept that some maladapted character types at maturity are rooted in stressful environmental influences during childhood. Finally, the many adaptive modes of coping with the stresses of life means that in the final analysis the real life situation -- that is, environment -- is the key to the individual's actual behaviour.

As an example of a type of approach to the identification of the genes for the traits N, P and A, we mention the supposition that the **a** locus lies on the short arm of chromosome 6, closely linked to the HLA (histocompatibility) group of genes. This follows from several observations. First, several conditions associated with the HLA loci (e.g. rheumatoid arthritis, ulcerative colitis, Graves' disease) are associated with an incapacity to express fully the trait of aggression [21-23]. Second, there is evidence for the existence in the HLA region of a single gene predisposing to a wide variety of endogenous disorders [21-24]. Finally, there have been reports that some schizophrenic and affective disorders may be associated with the HLA loci [25-27]. Thus, it is possible that a well-known genetic marker for the trait A already exists.

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TABLE 1

Table 1. Principal character types of model: Comparison with literature. (Citations refer to numbers in panel at bottom of the table).

Character types of model Personality states from literature

Dominant

N	Narcissistic	narcissistic [1,3,5,8] sanguine [6]
A	Aggressive	aggressive vindictive [1] aggressive-sadistic [3] paranoid-aggressive [5] antisocial [5,8] choleric [6]

NA	Narcissistic-aggressive	competitive-hypersexual [1] histrionic [5] hysterical-hypomanic [8]
NP	Narcissistic-perfectionistic	perfectionistic [1] responsible-hypernormal [3] compulsive [5] phlegmatic [6] obsessive [8]
PA	Perfectionistic-aggressive	power behind the throne [1] rebellious-distrustful [3] passive-aggressive paranoid [5,8]
NPA	Narcissistic-perfectionistic-aggressive	managerial autocratic [3] explosive [8]

Submissive

Non-compliant: juvenile onset

A-	Aggressive borderline	schizoid-schizotypal [5] schizoid [8]
PA-	Perfectionistic-aggressive borderline	schizoid-schizotypal [5] schizoid [8]
NA-	Narcissistic non-compliant	dependent histrionic [5] cyclothymic [8]
NPA-	Narcissistic-perfectionistic non-compliant	inverted sadistic [1] dependent [5] phobic-anxious [8]

Compliant: juvenile or maturity onset

A=	Aggressive schizophrenic	paranoid schizophrenic [2]
PA=	Perfectionistic-aggressive schizophrenic	catatonic or paranoid schizophrenic [2], paraphrenia systematica [2], affect-laden paraphrenia [4]
NA=	Narcissistic compliant	self-effacing masochistic [1] dependent histrionic [5], depressive, masochistic, hypomanic [8]

Resigned

Maturity Onset

-A	Aggressive schizophrenic	paranoid schizophrenic [2]
P-A	Perfectionistic- aggressive schizophrenic	catatonic or paranoid schizophrenic [2]
N-A	Narcissistic resigned	resigned [1], avoidant [5]
NP-A	Narcissistic- perfectionistic resigned	resigned [1], avoidant [5]

Non-Aggressive (Narcissistic withdrawn)

Juvenile onset

N-	Narcissistic borderline	schizoid-schizotypal [5] schizoid [8]
N-P	Narcissistic perfectionist borderline	schizoid-schizotypal [5] schizoid [8] borderline autistic child [7] idiot savant [7]

Juvenile or maturity onset

N= Narcissistic hebephrenic schizophrenia [2]
schizophrenic

N=P Narcissistic- catatonic, hebephrenic
perfectionistic or acute-onset paranoid
schizophrenic schizophrenia [2,4]
autistic child [7]

Maturity onset

-N	Narcissistic schizophrenic	hebephrenic schizophrenia [2] expansive paraphrenia [4]
-NP	Narcissistic- perfectionistic schizophrenic	catatonic, hebephrenic or acute-onset paranoid schizophrenia [2, 4]

[1]Horney (refs. 11,15-20); [2]Kraepelin (ref. 28); [3]Leary (ref. 5);
[4]Leonhard (ref. 12); [5]Millon (ref. 6); [6]Paré (ref. 29);
[7]Rimland (ref. 13); [8]Stone (ref. 7).
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TABLE 2

Table 2. Possible genotypes corresponding to phenotypes of model.
(Note: this table was omitted from the published version because of space considerations).

<u>Phenotype</u>	<u>Genotype</u>
Aggression (A)	
absence of A	a~a, a~a~, a~a~
A	aa
A-	aa~, a-a~
A- (phenocopy)	aa
A= (environmentally induced)	aa, aa~, a-a~
-A (environmentally induced)	aa, aa~, a-a~
Narcissism (N)	
absence of N	n~n, n~n~, n~n~
N	nn
N-	nn~, n-n~
N- (phenocopy)	nn
N= (environmentally induced)	nn, nn~, n-n~
-N (environmentally induced)	nn, nn~, n-n~
Perfectionism (P)	
absence of P	p~p~
P	pp, pp~