

Chapter 7. Big Three Functions

Major Points

- **The Big Three affect a large number of traits in addition to mood, both in the presence and in the absence of mental illness, and thereby have a profound influence on both personality and mental illness.**
- **Ser and nore together may form a cognitive-sensory-emotional filter, with a high ser/nore ratio deadening these entities.**
- **Strong nore may be associated with physical endurance, cancer, and homosexuality.**

Now we'll discuss some of the traits that the Big Three may affect, including: thought, sensation, emotion, mood, stress tolerance, drive states (such as hunger and thirst), sleep, movement, learning and memory, disease, and gender differences/sexual preference. I hypothesize that each of these traits is affected by the Big Three both in the presence and in the absence of overt mental illness. In this section we'll focus on the effects of the Big Three in the absence of overt mental illness, and in Chapter 10 we'll discuss the relationship between the Big Three and specific mental illnesses. By having all of these functions, the Big Three have a profound influence on both personality and mental illness, in essence because these functions, or disturbances of them, produce personality and mental illness, and thereby drastically affect our experience of the world and quality of life. I think these traits also tend to correlate in a given person, consistent with the existence of the neural integrator or at least common Big Three input to various circuits. The bottom line is that the Big Three do a lot more than just affect mood. And keep in mind that a given person with weak ser, for example, may only exhibit a subset of the traits associated with weak ser that I have described below.

Thought

Thought is at least principally a prefrontal cortical phenomenon, and this region of the brain receives strong Big Three input, particularly from dop. The Big Three affect both the rate and subject matter of thought—cocaine strengthens dop strongly and causes both faster and more grandiose thinking, as well as paranoia. Ser and nore may only affect the subject matter of thought, with ser (and possibly nore) serving to filter out minor details, consistent with their roles in dominance discussed in Chapter 13. Thereby, strong ser (and possibly strong nore) produce instinctive intelligence, whereas weak ser produces technical intelligence. In other words, people with strong ser tend to think about the most salient phenomena, or the 'big picture', whereas people with weak ser tend to think about fine details. There are, however, exceptions to this simple model.

Self-esteem is at least partially a type of thought, and is also related to mood. As described in *Listening to Prozac*, ser plays an important role here, and its strength may be proportional to self-esteem. Dop strength may also be proportional to self-esteem; so self-

esteem should correlate with the sum of ser and dop strength, though this is not to say that Big Three strengths are the only factors that contribute to self-esteem, to the exclusion of life experiences.

Speech is a reflection of thought, and difficulty articulating speech may represent a state of hypofrontality, discussed in Chapter 10. Obsessive thinking, as in obsessive-compulsive disorder (OCD), is related to activation of subcortical basal ganglia circuits (which are brain areas that affect movement and cognition) that can be affected by the Big Three (most well established for ser strengthening drugs).

Sensation

Sensation is defined here in the traditional manner, namely as consisting of the five basic senses: vision, hearing, taste, smell, and touch. According to My Case Study, ser deadens the senses and nore heightens the senses. In addition, depression or simply expanded dysthymia (discussed in Chapter 11) also deadens, and very likely at least transforms, the senses. So with equal amounts of dysthymia, higher nore/ser ratio people should have more acute senses than lower ratio people. In summary, both expanded dysthymia and the ser/nore ratio affect sensation.

Additional evidence that ser and nore affect sensation: 1) the street drug LSD affects sensation and acts on ser receptors, and 2) ser and nore brainstem neurons connect to sensory cortex. Furthermore, my perception of people—with women looking more attractive—was affected by ser altering drugs and nore altering drugs, consistent with sensory perception not being an objective, point-for-point representation of the world.

Since someone with a high ser/nore ratio has strongly deadened senses, the world may seem to be ‘held at arm’s length’, whereas for someone with a low such ratio, the world may seem to be ‘up in one’s face’. Such sensory filtering may partially explain why strong ser can produce dominance.

The bottom line is that sensory acuity, like emotional responsiveness and characteristic thought patterns, is part of personality (a trait). For example, sharper senses may lead to a greater sense of aesthetics. Psychophysical studies, which are psychological experiments aimed at measuring properties of sensory perception, have shown that people perform differently on measures of sensory acuity. The current theory suggests that women tend to have sharper senses than men due to an average ser/nore ratio difference—though this difference may be counteracted if women tend to exhibit depression or expanded dysthymia more commonly than men—including a more refined sense of smell than men, which has been demonstrated experimentally.

Emotion

Combining the hypotheses about ser and nore affecting thought and sensation, ser and nore may together form a cognitive-sensory-emotional filter, with a high ser/nore ratio producing deadening of these entities and a low ser/nore ratio producing heightening, though this idea may not apply to those exhibiting nore dominance (see Chapter 13). By cognitive deadening, I mean that the person tends to think about the most important phenomena, not that her rate of thinking is slowed. By sensory deadening, I mean that her senses are less acute. By emotional deadening, I mean that the intensity of her emotions is diminished. If ser and nore form such a filter, ser and nore may produce

alteration of thoughts, senses, and emotions in addition to affecting the properties mentioned above.

The Big Three may also affect the ability to experience pleasure. For example, psychiatrist Peter Kramer reports in *Listening to Prozac* that some of his patients who took Prozac, a ser strengthening drug, had greater ability to experience pleasure. More generally, expanded dysthymia, which involves non-optimal Big Three strengths, diminishes the ability to experience pleasure.

One's general level of interest in things is probably mediated emotionally. Ser may universally deaden interest, by deadening interest in all things, and nore may universally heighten interest, which is related to instinctive and technical intelligence. One could also hypothesize that expanded dysthymia (which is characterized by non-optimal strengths of ser and/or nore) deadens interest, and euthymia (which is characterized by optimal, mid-range strengths of ser and nore) heightens it. So both factors probably contribute to level of interest. Moreover, dominance itself may affect general level of interest by diminishing it.

Strong ser encodes compassion (as in Peter Kramer's observations), strong nore may encode empathy and jealousy, and, most importantly, having optimal strengths of ser and nore—lack of expanded dysthymia—produces most of the positive emotions. In other words, a dysthymic strong ser/weak nore person should not have the same emotional profile as an equally dysthymic strong nore/weak ser person. In addition, weakening nore may produce emotional stabilization, since nore may play a general role in intensifying emotions, and such stabilization may be beneficial if the individual is overly sensitive emotionally. Finally, a study of the nore weakening beta blocking drug propranolol indicates that nore plays a role in allowing a person to recognize facial expressions of sadness in others.

Mood

Mood can be thought of as a baseline state of how one feels, whereas emotions are alterations produced by stimuli, such as thoughts or sensations, and are superimposed upon mood. I think the Big Three must be at mid-range strengths to produce optimal, constant mood. An important point is that the brain can be 'turned off' by Big Three strength abnormalities while mood is still within the normal range or even high (hypomanic). For example, people with expanded dysthymia, which is characterized by non-optimal Big Three strengths, may not report feeling sad, but normal positive reaction to external events is muffled or even completely absent due to a constant, lower than optimal mood.

Stress Tolerance

If ser and nore have opposite effects on stress tolerance—with ser increasing it and nore decreasing it—this is consistent with ser dominance but may not apply to individuals exhibiting nore dominance. Nonetheless, drugs that strengthen ser, such as Prozac, can increase stress tolerance and decrease anxiety, and drugs that strengthen nore, such as yohimbine, can decrease stress tolerance and heighten anxiety. Dop may also increase stress tolerance, consistent with its role in dominance.

Drive States

Drive states such as hunger, thirst, and libido are also affected by the Big Three, including during mental illness. These entities can be either too strong or too weak when the Big Three are at non-optimal strengths, and this may partially explain why so many people have weight problems, since non-optimal strengths are so common (see Chapter 11). Ser boosting drugs such as the SRIs can deaden the libido, though they can also restore it by treating depression or expanded dysthymia.

Sleep

One of the functions of sleep may be to regulate the *levels* of the Big Three. This is a chicken and egg issue because sleep may regulate the Big Three levels and the Big Three levels may in turn regulate sleep. During waking, the brainstem ser and nore neurons fire action potentials—and thereby release neurotransmitter—in response to stimuli and also at a baseline level, fire more slowly during NREM (non-rapid eye movement) sleep, and don't fire at all during REM sleep. Therefore, as stated in Chapter 4, ser and nore synaptic levels build as the day wears on and are reabsorbed during sleep. Perhaps when a minimal ser or nore level is achieved during sleep reabsorption, one wakes up, or when there's too much of these transmitters one sleeps too much. And in explaining the effects of the Big Three on sleep, it may be important to distinguish between NREM and REM sleep, as their ratio of duration and absolute amounts are affected in depression, for example, and sleep disturbance can occur in mental illnesses other than depression and bipolar disorder. The conservative conclusion at this point is that the Big Three affect sleep but the precise nature of the effect has yet to be determined. In addition, the neurotransmitter acetylcholine clearly plays a role in sleep.

The point is that sleep is a largely objective measure of mental illness and possibly the functioning of the Big Three, though no simple relationship between the Big Three and sleep may exist that is consistent across all individuals. So abnormal sleep may be neither necessary nor sufficient for mental illness, but nonetheless may provide objective, additional evidence that it exists in a given case.

Movement

There is no reason why the Big Three can't affect movement, since they are present in the motor cortex, cerebellum, and spinal cord (and for nore, the heart), and these parts of the central nervous system are intimately involved in generating movement. For example, there is potentially a relationship between movement and dominance, since swift, powerful movements and high energy may aid in achieving and maintaining dominance, and dominance itself may be strongly affected by the Big Three (see Chapter 13).

There may also be a relationship between strong nore and physical endurance, since endurance athletes, such as marathon runners and cyclists (example: Lance Armstrong), tend to have the personality traits (see Chapter 12) of super strong nore. And beta blockers, which weaken nore, can reduce endurance. If strong nore really does produce improved endurance, surely it doesn't do so solely by affecting the motor cortex—the mechanism may be mediated by connections with the heart, spinal cord, or

other aspects of the peripheral nervous system. So perhaps ser and dop enhance explosive movements, whereas nore enhances sustained movements.

If the Big Three affect aspects of motor performance, then do they also affect taste preference, and therefore preference for intake of certain types of food? Food preference may be strongly linked to movement, and may serve to further enhance the biases that the Big Three already place on characteristics of movement. Ser and dop may increase a preference for foods that enhance explosive movements (such as simple carbohydrates), and nore may increase a preference for foods that enhance sustained movements (such as vegetables). So due to the potential role of the Big Three in biasing movement, Big Three altering drugs may be athletically performance enhancing, or at least altering, tools.

Learning and Memory

The Big Three very likely affect learning and memory, including but not necessarily limited to their effects on thought patterns, described earlier in this chapter. For example, abnormally low strengths of the Big Three may cause hypofrontality—which is poor attention and poor memory due to underfunctioning of prefrontal cortex—or instead high strengths may produce normal to supranormal prefrontal functional enhancement. During mental illness, learning and memory are almost always perturbed, usually in a negative manner, as was the case in My Case Study. However, cognitive functions such as learning and memory have been more closely associated with another modulatory neurotransmitter, acetylcholine.

Disease

If Big Three strength abnormalities or dysfunction cause diseases in addition to mental illnesses, it could be because of the mental illnesses they produce, or because of the abnormal strengths or dysfunction themselves, independent of mental illness. In other words, the established association of heart disease being worsened by depression may be due to abnormal Big Three strengths and not the depression. This principle may be relevant for Parkinson's disease and dop, or Alzheimer's disease and acetylcholine, where these two transmitter systems are closely associated with these two respective diseases.

In either case, I think asthma and some types of cancer are associated with strong nore, due to the personality traits of a number of people I have either known or known about who had these diseases. Likewise, mitral valve prolapse—a heart abnormality—is associated with autonomic (i.e., the part of the nervous system that regulates involuntary action, and uses nore as a signaling molecule) hypersensitivity, consistent with a strong systemic nore basis. Perhaps these diseases could be prevented or, in the case of asthma, treated with drugs that weaken nore, such as clonidine.

Certain types of epilepsy may be associated with Big Three strength abnormalities, since Big Three drugs, such as certain antidepressants, can trigger seizures. Likewise, migraine headaches may be caused by weak ser and/or strong nore, since drugs that strengthen ser and drugs that weaken nore can provide effective treatment.

Gender Differences and Sexual Preference

I think men tend, on average, to be slightly stronger in ser and slightly weaker in nore than women, though there seems to be a huge amount of overlap between the two sexes in these two strengths. There are now PET brain imaging data that indicate that men, on average, tend to synthesize about 50% more ser than women. This putative ser strength difference may at least partially explain the higher reported rates of depression in women. Based on this hypothesis, I initially thought that the ser and nore systems form the basis of masculinity and femininity, or at least heterosexuality and homosexuality—namely that heterosexual men tend to be strong in ser, weak in nore, whereas homosexual men tend to be strong in nore, weak in ser. And heterosexual women tend to be strong in nore, weak in ser, whereas homosexual women tend to be strong in ser, weak in nore. This is probably an oversimplification, particularly since many bisexual or homosexual women have the personality traits of super strong nore—examples: Ellen DeGeneres, Anne Heche, Martina Navratilova. However, perhaps all male bisexuals and homosexuals have strong nore (as may effeminate men), as if strong nore is necessary but not sufficient for male homosexuality. This sort of reasoning leads to the conclusion that a sexual ambiguity/homosexuality circuit exists in certain brains, the activation of which requires strong nore. So maybe one factor that can affect masculinity or femininity is ser and nore strengths, and drugs that affect ser or nore may subtly affect sexual preference. Mania and depression, which probably involve Big Three abnormalities, certainly can affect sexual potency, though not necessarily sexual preference.

One important component of sexuality is pattern recognition circuitry for responding to the opposite sex, including visual (face/body cues) and other sensory cues. The greater the optimality of ser and nore, as in My Case Study, the greater the activation of this circuitry, resulting in greater perceived prominence of these cues. Remember, in My Case Study, when ser and nore were adjusted with drugs closer to mid-range strengths, women actually *looked* more attractive, probably because this circuitry was more activated. Mental illnesses, including but not limited to bipolar disorder and major depression, may also affect this circuitry.

I think women tend to be more emotional than men, even when individuals from the two sexes have the same underlying Big Three strengths. So ser and nore differences probably don't explain all of the differences between the male and female brains, including potentially many hardwired circuitry differences. Maybe the same circuit that produces homosexuality affects the emotions, or these circuits correlate in activation. So the male and female Big Three emotion circuits may be a lot different from one another, but do the male and female brains differ in other traits listed here as Big Three functions, other than sensory acuity which I discussed earlier?

Miscellaneous Traits

Now I'll touch upon a few other traits that may be affected by the Big Three. Coldness perception is defined here as the subjective feeling of how cold it is, and it may be affected by the Big Three. Ser may increase coldness sensitivity (at least it did for me, while I was hypomanic on Zoloft, though for some people it may decrease sensitivity), nore may decrease coldness sensitivity (at least it does anecdotally in some cases of mania), and dop may have no effect on coldness sensitivity. Ser (and nore, dop) may also

affect the traits explored in Peter Kramer's *Listening to Prozac*: compulsiveness, rejection sensitivity, and risk taking.

There's an established link between weak ser and violence. Maybe some weak ser individuals tend to perceive other people as threatening, and this makes violence more likely; or perhaps their potentially low, irritable mood plays a role. Nonetheless, it is probably incorrect to say that weak ser is necessary but not sufficient for violence, since other Big Three strength arrays can probably also produce violence—it's more accurate to say that weak ser interacting with particular hardwired circuitry may make violence more likely. So prisons may in some ways be the modern vestiges of the state mental hospitals so abundant in the United States prior to the 1950s.