

*The Science of Recovery: Introduction to Brain
Development and Neuroplasticity*

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Question #1: Could you list the different circles again? (4 slots; 12 slots).

The references to the number of social slots in the "clique" group was from Dunbar and Spoor (1995) determined the mean number of kin contacted was 3.62 for men and 8.57 for women. This was the innermost circle in the diagram presented in the webinar. The next grouping of 12 social slots, was taken from the work of Dunbar and Spoor identifying the "Sympathy Group." The outermost grouping in the webinar diagram referenced of 150 acquaintances was identified by Dunbar, (1996) as indicators of the numbers tracked by our social mind. This outer grouping was also elaborated on by the following researchers:

Grouping sources examined were as follows:

- Neolithic villages (Middle East, 6500-5500) found that the typical size of the communities were between 150-200 individuals, Oates (1977).
- Hutterite farming communities (Canada) revealed a typical size community was 107 people, Mange & Mange (1980).
- E. Tennessee rural mountain community discovered the typical community size at 197, Bryant (1981).
- Research specialties in the sciences and humanities uncovered the typical numbers at between 100-200 individuals, Becher (1989).
- Social network size (mean of two experiments) showed the number to be about 134 individuals, Killworth et al. (1984).
- Social network size (recipients of Christmas cards) indicated the number at about 154 people (Hill & Dunbar)(submitted).
- Average church congregations- 200 members (Source: Urban Church Project (1974).
- Nebraska Amish Parishes – 113 members (Hurd, 1985).
- Maniple (Roman army- 350-100 B.C. Montross (1975).
- Company (mean range of 10 WWII Armies) 180 averaged from 124-223) by McDonald (1955).
- Hunter-gather clans (mean range of 9 tribal societies) 148 (averaged from 90-222 members; Dunbar (1993c).
- All references taken from the text Human Evolutionary Psychology, p. 246.

First Presented in the 3rd modular Training Series funded by Ca. First Five Foundation, Kern County Bakersfield: The Impact of the Extended Family on the Brain: Winnowing of Social Networks; Average "social slots" (this author's interpretation); and Average Group Sizes. References listed above.

The critical assumption presented is that without these "slots" filled, as the substance using individual retreats into social isolation, autonomic arousal and emotions of anxiety, depression, grief, loss, helplessness, despair, and meaninglessness are natural consequences that without further substance use, would motivate the individual to seek the solace of the "community" to essentially regulate or how you feel in your body. The psychological, emotional and purposeful solace of the presence of other intimates soothes the soul. This is the unconscious value of AA; recovery groups; NA; church groups; etc. Having your clients visually review the chart; place names in the empty circles; can reframe the experiences of mood swings and anxiety as a motivator. Using the body's instincts for safety promotes social engagement.

Question #2: How will all this information affect SUD treatment as it exists now? Will the resources be there to implement the changes?

Question #2, Part I: How will all this information affect SUD treatment, as it exists now? Unfortunately, I do not see this information dramatically changing existing SUD treatment, as it exists now. Even though I am tremendously excited and deeply passionate about disseminating the information, my essential thesis is that mental health and substance abuse models in both current forms lack the technology to accurately diagnose the disorders they are trying to treat. These services are marginalized status and funding wise. They are high stress, high turnover jobs with poor working conditions. They do not have the fiscal and social backing to teach this information to new counselors from the beginning of their professional training. That being said, the human genetic code has been read like a book as evidenced the Human Genome Project. Medicine is described as being fully in the Genomic Age. The website Online Mendelian Inheritance In Man OMIM is widely available and can be accessed by anyone with a computer and the Internet. Without a basic understanding of how genes operate, the database only points to the complexity of the topic. Everyone should have a course in basic genetics. Genes build brains. Neuroimaging and neuroscience have been making massive breakthroughs in our understanding of the human brain for the past 20 years. The images associated with the Connectogram can be accessed through Wikipedia. Unfortunately, our historical models or paradigms lack a fundamental scientific grounding, so much of the data presented will feel overwhelming and the topic may intimidate. Don't be afraid. Keep going and persist. Learning is slow. Complex learning is even slower. Decades slower. Because our historical approaches to mental health and substance abuse treatment were such that they were bi-products of brains without any real insight as to how these complex organs of consciousness did what they did. Brain constructed models became traditional ones, formed prior to our understanding of an even deeper level of analysis- the genetic contributions to developmental neuroscience. As the information is disseminated and integrated into SUD treatment, I believe that old assumptions about how people become addicted and how they can recover will revolutionize the practice. We will need objective tools that help measure genetic activation and have some meaningful access to neuroimage or other forms that can lay the wiring of the human brain bare. We will struggle to move forward without ways of assessing the existing brain connections for pre-treatment modeling; measuring degree of change as treatment is applied and providing post treatment measurements as well. These should all as a hypothesis may one day be accomplished just as checking the signals to and from the body without necessarily activating belief.

Question #2, Part II: Will the resources be there to implement the changes? No. Not currently or even within the very near future. The cost of the treatments I described would have to come down dramatically. The science needs to be stepped down-made accessible and real to our everyday experiences. The software and hardware to create practical tools needs to be developed; pilot tested; evaluated and tuned before the typical practitioner can use such tools to help solve real world problems. A careful analysis of history demonstrates that change is inevitable and the pace of technological change continues to accelerate. It is clear to me that the attainment of healthy nervous systems may one day approach a moral right, but in our current state, we are far from the mark. Currently, the tools described are not integrated. However-the dissemination of this information could: 1) increase the demand for practical-objective tool development; 2) invigorate drawing the existing, fragmented technology into accessible, low-cost, effective diagnostic equipment available to front line clinicians in both fields mentioned; 3) inspire the formation/creation and galvanize the funding needed to create the above mentioned resources. 4) Increase awareness of the complexity of the topic to invite lifelong learning. 5) Enhancing your understanding of what you're dealing with in your clients and increasing competency.

Question #3: Is it possible that a mother's mood while pregnant can affect the genes before birth? Does the developmental line start at conception? Or is it from birth and beyond? All excellent questions that I tackled in the first modular training in the series that I entitled, "Building a Healthy Brain: From Saints to Serial Killers." Without retracing the entire history, I produced about 170 PowerPoint slides back in 2002 for the California First Five training and addressed each of these questions. Part I of your question regarding the mother's mood and the impact on developmental outcomes-obviously predating knowledge of genetic expression-can be found as early as the Renaissance (1300-1600 A.D.). Renaissance physician asked this question and essentially promoted the philosophy that pregnant women "should" try to maintain a sense of emotional centeredness while pregnant and nursing. Chronic stress in early pregnancy is a co-risk factor-but does not necessarily translate into poor developmental outcomes by itself per se. However, in Fetal Alcohol syndrome, stress is clearly an environmental trigger. Leaping into the modern age, a model called the Fetal Origins hypothesis by David Barker in 1986 and later the science of Epigenetics-translated as "above the genome" - demonstrate that lifestyle choices - sleep, diet, stress levels, exercise and levels of social engagement- can activate or suppress the strength of activation of harmful genetics. (For the exact mechanisms of how nature and nurture co-interact-see the NOVA documentary-Ghost In The Genes, PBS, June 19, 2007.) *Does the developmental line start at conception, or is it from birth*

and beyond? Absolutely. Pediatric Neuropsychology traces problems beginning from the start of life as evidenced by the autistic spectrum of disorders: Pervasive Developmental Disorder; Autism & Asperger's Disorders; Low Birth Weights; Metabolic and Neurodegenerative Disorders. The study of modern genetics demonstrates that nature and nurture co-interact across the entire lifespan. We will need to be able to clearly show how experiences hasten or delay brain maturation and functioning.

Question #4: What is your concept of "the mind?" It seemed as though you were making a distinction between the mind and brain.

My definition of the mind is that it is a by-product of the brain's processes. This is evidenced by states of consciousness around birth and death; by chronological development of complex biological organisms and the aging process; by the alterations in consciousness through substances; by the gaining of function via age and the loss of some brain functions by environmental insults, etc. Through these insights are now starting to pierce psychology, sociology, history, politics and religion, and while the human experience is diverse, so too are the variety of descriptions as to how we get this way. Again, many of these competing models lack any real science to support them, but are cherished and supported none-the less. In the thousands of years predating the rise of some of research tools we discussed thus far, previous models of the mind solely produced by the functional wiring of the mind before it. Descartes separated mind from body philosophically in the 1700's without any sense of the internal wiring and the West still strains to overcome this "model dependent reality." In the East, philosophy did not make this categorical error, so there is no separation between mind/brain and body. It is no surprise that a fully elaborated Eastern concept with 5,000 of traditional explorations of methods to alter consciousness is now repackaged as Mindfulness. It's not a gimmick. It has supported by neuroplasticity research. The neural correlates of consciousness are now a rich science. Artificial Intelligence and Cognitive-Affective Neuroscience are but two examples. Nobel Prize winners like the co-discoverer of DNA Francis Crick published a book that indicated there is no separation between mind and body. He drew a harsh line on what was going on in the brain and how it related to consciousness. There are other examples of equally impressive scholars drawing other conclusions about consciousness. On a practical level, everyday use of the mind can alter how the brain works. The brain builds the mind, and the user must reach across critical thresholds of development to be able to reshape their own minds through their own efforts. Science does come up short on making the leap beyond personal meaning or comment on inspiration and the experiences we live for. That's why I don't mind preserving a degree of magic in my approach to the subject-that is a topic for another presentation.

Question #5: Was a yes or no correct answer provided regarding the personality polling question? Are you saying there is such a thing as an addictive personality?

From memory, I believe that about 73% of the respondents said they held a belief that there was such a thing as an addictive personality while 27% thought there was not such a thing. I believe the exact answer will be provided. What was behind it? It was poised to me to offer a question that gauged an anonymous public opinion poll. That there is no right or wrong question as the question was stated. My sense is that while the answer is not a true or false one, but that all human behavior falls along spectrums. We have been taught through education and also as a bit of a byproduct of all minds for the data I have come across is that the brain is very good at slicing up the outer world into an inner world of distorted facts. The continuum is pointing to many genetic; developmental; biological; social; psychological; cultural; historical and environmental inputs that personality is not so subject to being placed in an address, but prefers to move from house to house along a spectrum of characteristics. That is the best I can do. I believe the data will one day be in that there is NO addictive personality per say, but the concept has enough facets of validity as to not entirely through it away either. As it stands, I am unaware of such a term

Question #6: Is there scientific evidence of using drugs like ecstasy, cocaine, alcohol, marijuana, and psychedelics during the adolescence or puberty phase causing mental illnesses such as depression and anxiety? If so, where and what is it?

I believe the science is amassing that the number of genetic diseases and disorders triggered and modified by both environmental and lifestyle factors is fairly robust. I would start again with the OMIM (Online Mendelian Inheritance In Man) only to acquaint you with the genetic markers thus identified. The complex interaction between all of these genetic switches is another matter. Consult with journals in psychiatry; look to worldwide science magazines such as Nature and Science-peer reviewed with very high thresholds of scholarly review and a grasp of the fundamentals of scientific literacy. There are now also magazines that track breakthroughs in genetics. Even in the magazine called Discover, the year-end

review will usually have one or more critical breakthroughs in the development of vaccines to block neuronal activity or other drugs impacting the neurotransmission of substances described in the original question. All of these resources examine exactly what harmful genetics are activated; how strong must the change be to alter developmental pathways for how the brain/body/mind operate together-such as in more extreme cases of anxiety, depression, executive functioning and psychosis can produce the functional impairments we observe. Environmental triggers do not operate in isolation. Development is a moving target. All the lifestyle variables play their part. The person's personality; focus; drive; intelligences and ways of being in the world modulate direction. Thinking of all of the mental illnesses and substance use disorders as malleable to focused persistence and motivation. There is an approach in science called emergent complexity. This approach to integrating a deeper understanding of how onset; frequency; intensity and duration of use can influence-not necessarily cause-but contribute to increasing functional impairments, or decreasing the aftermath through the management