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Research Article

Neurobiological Research Enabling Psychotherapists to Use New Methods for Treating Patients with Attachment-Related Disorders

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ABSTRACT

Recent neurobiological research has contributed significantly to our understanding of the process of attachment. This article concerns a treatment method utilizing this understanding in clinical practice. Using simultaneously recorded brain wave patterns in mother–child dyads, researchers have determined that brain-to-brain synchrony-or intuitive synchrony is the basis of attachment. This article provides a model for using this type of synchronicity in psychotherapy practice to restore individuals' capacity for attachment. The process entails using a mode of relating that is identical to the brain wave pattern in intuitive synchronicity. To accomplish this, therapists must modify the psychotherapy situation in a systematic way guided by their understanding of the brain function in the region that is deficient. As demonstrated in this paper, the brain wave deficit is in the nucleus accumbens brain region. By constructing the treatment setting to mimic the function of the intuitive process, and by bringing in other frames of reference into the psychotherapy-timed exactly as is needed by the patient-an intuitive resonance is developed, reducing the attachment capacity deficit. In the case study presented, the deficit resulted from and in drug abuse; with the psychotherapeutic resolution, the patient simultaneously resolved the drug problem.

Keywords: Brain wave patterns; Clinical Practice; Intuition; Mother–child dyad; Parent–infant relationship; Psychotherapy

INTRODUCTION

Mental health-based treatment evolved from the same medical model that had generated success in all medical treatment; that is, the individual needs to be viewed as autonomous. As in standard medical treatment, the clinician has stood as an objective, impartial observer mediating between patients' internal processes and using interventions Bowlby showed, as did other attachment-based psychotherapists that followed his lead,that using an attachment paradigm illuminates various attachment failures that could both predict the development of psychopathology and provide treatment. Bowlby cited evidence that the mother's bond to her infant served as a releaser of the infant's instinctual motivation capacities and supported the development of those capacities. He also claimed that there were likely a hierarchy of those instincts that the mother was engaged in releasing. The composite of her availability in developing those releasers resulted in the infant's attachment to her and formed his or her sense of a secure base for their subsequent development.

As promising as this beginning was, to date it has not been substantially fulfilled.Currently, psychotherapists use attachment theory to focus on the therapeutic alliance with their patients. They have shown that the more secure the attachment ability the patient has, the more effective the alliance between therapist and patient can be and the more successful the outcome of the treatment [2].However, the research on how to make this alliance more productive when there is an attachment deficit has been the major obstacle to furthering the effectiveness of the attachment paradigm. This paper presents the possibility that a major reason for this is that the original developers of the attachment concept were describing their observations of the appearance of attachment and not its underlying dynamic functions.By understanding those functions, direct interventions could be provided to reverse them. To succeed at developing the science of attachment development for its application in psychotherapy, researchers have turned to the neurobiological underpinnings of successful attachments using

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animal models [3] and mother-infant human models [4] and applying the lessons learned to the psychotherapy situation. The reason for this is that instinctual development is biological and the formation of an attachment to the mother is psychological. Neuroscience has a considerable role in developing our understanding of how this evolution occurs and to our developing a more effective interventions in remediating its failures [4].One of the basic obstacles that neuroscience has uncovered to our being able to improve our treatment of attachment deficits has been that the process may not be just one development but a sequence of developments. As Bowlby had anticipated there are a hierarchy of instincts that the mother facilitates in the process of helping her infant develop an attachment. The evidence supports that she may be more actively involved in facilitating the emergence of more instincts than the original attachment theorists had known about. For example, Feldman [5] provided evidence that biobehavioral synchrony between mothers and infants was a basic element of the attachment process in which the mother becomes attuned to her infant's biological and psychological tendencies and promotes them with her synchronous behaviors. She demonstrated that this process facilitated parent–child relationships, friendships, romantic attachments, and even relationships with strangers. Further, she cited evidence that the same attachment processes were involved in heart-rate coupling, endocrine fit, and brain-to-brain synchrony between attached individuals. Feldman [5] provides evidence that this synchrony is centered on the brain's pleasure center, the nucleus accumbens, and showed how patients whose mothers were not able to exhibit biobehavioral synchrony did not have as responsive a nucleus accumbens nor did her child develop one, due to her communication failure. In the view of her group of investigators, the basis of attachment was the experience of pleasure in the infant and mother dyad. Just as Bowlby had anticipated, this group of researchers showed how the mother's interventions that were unconscious, facilitated the development of the infant's instinctual motivation. This type of research has informed psychotherapy treatments [6], as psychotherapists then attempt to simulate the same synchrony with their patients when forming alliances with them. Researchers have shown that attachment can emanate from different brain regions and can stimulate other dimensions of the instinctual process. For example, Schore [7] cited evidence that a different brain region, the orbitofrontal cortex, was the basis for a different form of attachment than the one discussed by Feldman. He showed that it was involved in the development of emotion-based attachment. The mother was promoting the genesis of her infant's emotions through her unconscious emotional based responses to her infant's developing emotions. Lenzi and colleagues [8] provided evidence that the amygdala is at the center of another attachment-based system which is based on the mastery of fear. In this system, the mother's unconscious responses help the development of the infant's capacity to experience fear and modulate it. Vrticka and colleagues [9] provided empirical support for this development Laurita, Hazan, and Spreng [10] provided evidence for a separate system based on the processing of empathy and the neural representation of close others. This attachment system had its origin in the mirror neuron/default mode brain system. Sullivan and colleagues [11] demonstrated that basic mother-infant attachments whether in lower mammals or in human infants stemmed from the hippocampus brain region and it involves a completely different type of attachment-based caregiving system. It entails the mother's instinct-based system, knowing when her presence with her infant was necessary. The mother's odor and skin to skin contact or similar basic biological attributes were the critical dimensions of this form of attachment. Based upon our understanding of the different dimensions of attachment which appear to form a hierarchy from the most basic hippocampal type to the most advanced cortically based types, each form of attachment necessitates a different facilitating response from the mother which facilitates the emergence of the instinct. Just as Bowlby had anticipated, the composite results in the formation of an attachment. By looking at these component subclassifications of attachment we may be able to determine the type of intervention needed by the mother to facilitate each, establish which type of failure is involved when particular patients may have not received that communication earlier in life and therapists may be able to provide it in psychotherapy. In this manner we may be able to use psychotherapy to more specifically reverse attachment deficits than we have been able to do before now. To further advance our ability to generate effective therapeutic interventions with patients who have a particular deficit in one of the brain node-based attachment processes, researchers have investigated the type of brain wave patterns which may be involved in the communication of mothers and their infants at each of those brain levels. This brain wave pattern may be the basis for the shared mode of communication between mother and her infant that facilitates each of these subtypes of attachment between them. It is possible that a failure on one of these modes of communication may be at the root of the unconscious-to-unconscious communication pattern between mother and her infant, the failure of which may have caused a specific form of attachment deficit that may be involved in any one mother-infant pair. If we can provide through psychotherapy that same mode of communication, we may be able to substantially reverse the attachment failure through the psychotherapy process. This might lead us to enabling psychotherapists to simulate a pattern of brain wave- based communication with patients who might not have had a successful communication with their mothers at that particular brain level. For example, Santamaria and colleagues [12] found that the synchronicity of the alpha brain wave (8-12 Hz) between mothers and their children was stronger when the mother was happy than when she was not. This may be the case because the alpha brain wave is responsible, for the functions of the default mode [13] which is associated with depression [14]. It is possible that this type of brain-to-brain synchronicity involved with the unconscious-to-unconscious based communication in that alpha brain wave mode may be an underlying cause for the communication failure in a particular mother-infant pair that occurs in depressed mothers and does not in more normal mothers. Sarro, Wilson, and Sullivan [15] measured the theta (slow wave activity, 4–8 Hz) in mouse pup brain with the mother present vs. absent from the nest. They found that the mother's presence was associated with a more regular electroencephalogram and a higher brain theta-wave predominance. The genesis of the theta-wave emanates from the mouse hippocampus and is associated with the formation of early frames of reference to organize perceptions. Pratt and colleagues [16] documented the

same increase in theta-wave presence to attachment cues in human children. These investigators also noted increased gamma-wave (fastest brain waves 35 Hz to 100 Hz) activation to attachment cues and noted that the degree of mother–child social synchrony in the home ecology was associated with this increase. This form of brain-to- brain communication emanates from a deeper level of the brain, the hippocampus, and has been shown to be associated with a different form of attachment. Atzil, Hendler, and Feldman [17] found that, in studying beta wave (12–38 Hz) activation in mothers comparing the introduction of a stranger baby vs. the mother's own baby, that the beta wave activation from synchronous mothers in the nucleus accumbens pleasure region was much higher as compared to intrusive mothers. They also found that the amygdala, in which fear is generated, had a much higher beta wave activation in intrusive mothers. Further, these investigators correlated the beta wave activation with the level of oxytocin—a bonding-related hormone. They measured the level of oxytocin, which was associated with the activation of the beta wave in both the nucleus accumbens and the amygdala. Hence, this fear generated brain wave-based communication is a third separate mode of brain – to – brain communication emanating in this instance from the amygdala brain region Further, alpha brain wave (8 –12 Hz) abnormalities were found to be over the right frontal lobe in insecurely attached infants when separated from their mothers compared with normally attached infants [18,19]. This brain wave pattern of communication may be associated with a separate brain region, the ventromedial to dorsolateral prefrontal cortex providing another basic attachment type with a separate brain wave – based mode of communication involved. Levy, Goldstein, and Feldman [20] found that gamma mother–child synchrony occurred in mothers and children observing videos of positive social play between those pairs. These different brain wave patterns associated with attachment-based abnormalities may give us a clue about the type of communication deficit between mother and infant that has led to the specific attachment deficit for each. It may lead us to forming the type of communication which we can provide patients in the psychotherapy situation to replace that deficit. Moreover, brain wave synchronicity can "train" the brain wave of infants to be coupled to that of parents and vice versa [20]. Uhlhass and colleagues [21], in a review article, showed considerable evidence that the synchrony of brain waves between individuals was associated with the generation of neuronal plasticity and the evolution of brain networks in early childhood. If we can develop a mode of communication with the patient in the psychotherapy situation which can simulate the brain wave-based deficit that each patient has that resulted in the attachment deficit they have, then we can replace that deficit through that mode of communication. As a result of this, we may be able to facilitate the resumption of the brain growth and plasticity that was lost by the failure of that unconscious-to-unconscious instinctual mode of communication's failure in the first place. The essential task is to determine the specific mode of communication that occurs between mother and infant and embodies this brain wave-based communication pattern at each particular brain node, and how we can simulate it in the psychotherapy process. This paper concerns the development of one such mode of relating, intuition, and its use as a way of reversing attachment-based deficits associated with the pleasure center, the nucleus accumbens.

ATTACHMENT AND THE ESTABLISHMENT OF UNIQUE MODES OF COMMUNICATION BETWEEN PARENTS AND CHILDREN

Since Bowlby [22] established the concept of attachment based on the premise that the mother–child relationship provided the infant with a secure psychological base from which to develop, Ainsworth [23] and her colleagues [24] established a Strange Situation paradigm in which they could empirically establish the responses of mentally ill patients to determine their "security" when faced with strange and potentially dangerous situations. Since then, investigators have attempted to establish a brain region that might be the cause of pathological responses to this safety paradigm. As discussed above, many such "candidate" brain regions have been proposed; however, none have been conclusively established. The purpose for this investigation is that, if we can establish one such region, we may reverse the pathology that might emanate from that region. Further, a discovered mechanism may generalize to the others as well, which may enable us to have a more substantive way of correcting attachment-related deficits. Feldman [25] as a contributing brain node toward attachment. The reason for selecting it is because that node has a distinct, well-established function in generating reward or pleasure [26 - 29], because there is a known form of psychopathology associated with its failure—drug abuse [30]—a known brain circuitry problem in that brain region in patients who are addicted [31], and an established relationship between drug-addicted patients and attachment failure [32, 33]. Moreover, it was the brain region chosen by Feldman [25] as representing the most basic attachment brain region. The key questions are: 1) How does an attachment failure cause a failure of the nucleus accumbens? 2) How does this failure result in drug abuse? 3) How can our understanding of this process result in an improved treatment, especially psychotherapy treatment for drug abusing patients? and 4) What does this understanding of the mechanism involved in drug-abuse attachment deficit tell us about all attachment deficits and how to treat them?

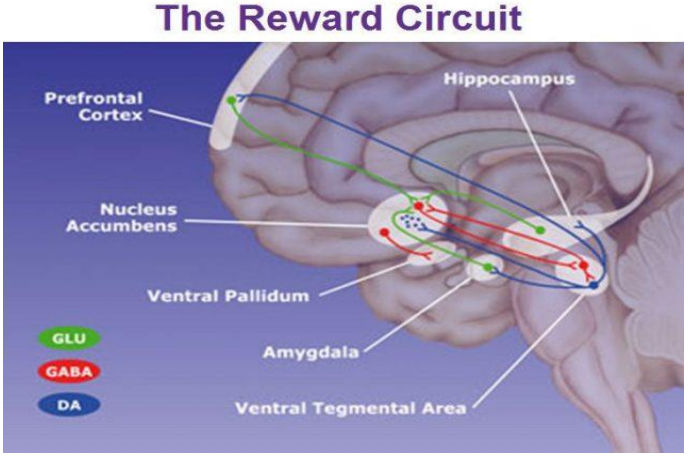

Figure 1: The nucleus accumbens and the brain's "reward circuit" key: Red-Gaba Gamma Amino Butyric Acid, Green Glutamate, Blue Dopamine.

The mode of communication at this attachment level is intuition. There is intuitive synchrony between the communicator and the recipient of the communication; but it is strictly an unconscious mode. Neither the sender nor the recipient is aware of what signals caused them to act and react the way they did. Each is responding to patterns of input registered from the other—patterns so subtle they do not know what they are. Yet the people are certain they are connecting. Tronick [34] provides us with an example of intuitive communication, that of a mother and infant playing peek-a-boo. As the game progresses and the intensity reaches its peak, the infant looks away and begins to suck on his/her thumb and stare into space with a dull facial expression. The mother then stops playing and sits back, watching her infant. After a few seconds, the infant turns back to her with an interested and inviting expression, at which point the mother moves closer, smiles, and says in a high-pitched exaggerated voice, "Oh, now you're back!" The infant smiles in delight and vocalizes. When they finish crowing together, the infant reinserts his/her thumb and looks away. The mother again waits, the infant turns back to her, and they greet each other with big smiles. This is a synchronous communication system based upon intuition. Tronick [34] explains a failure of intuition on the part of the mother. Instead of waiting for the infant to turn back, the mother intrudes by inserting herself into the infant's line of vision and clicking her tongue to attract attention. The infant does not turn back to the mother and, in fact, grimaces and fusses. For the mother who was successful in her intuition, there was no overt cue that she needed to wait - it was an intuitive response, based upon her connection to her infant. The mother's response was novel for both, and the infant's response in return was a novel one. The element of surprise caused the mother-infant pair to generate this pleasure together. When there is no surprise, there is no pleasure. Instead, there is a pleasure-based attachment failure. Mothers who cannot allow their unconscious to link with the unconscious of their child cannot succeed at this game. For there to be an attachment success, the mother must shift phases from an attention phase to non-attention and back to attention in a rhythm coordinated with her infant. In Tronick's [34] example, the intuitive mother can wait, which excites her unconscious associative stream with the goal of finding out the meaning of her infant's behavior. This is the incubation period. Once the stimulus of the infant's turning back occurred, the mother's associative stream reached a conclusion: in that instant, she realized her infant was playing a game and she responded with delight. Intuitive-based communication produces pleasure by exciting the nucleus accumbens pleasure center. This produces an increase in the transmitter dopamine and an excitation of the part of the nervous system connecting that nucleus to the motor implementation area, which consists of the corpus striatum, the ventral pallidum, and the prefrontal lobe, which records these pleasurable experiences as a basis for future actions that can lead to further pleasure.

Feldman and colleagues [5,35,36], in studies of vocal synchronicity, showed that, when mothers did not synchronize with their infants' vocalizations, it resulted in low dopamine secretion from the nucleus accumbens of the infants and was associated with a low amount of pleasure, while more synchronous infant-mother pairs resulted in significantly higher dopamine secretions. Levels of oxytocin, the bonding hormone, were also higher in synchronous mother-infant pairs than it was in the nonsynchronous. The prairie vole is more monogamous and social than other voles. Ross and colleagues [37] and Amadei and colleagues [38] showed that the increase in social bonding is associated with a circuit between the nucleus accumbens and the prefrontal cortex, and that the strength of this circuit is directly proportional to the voles' mating behavior. Liu and Wang [39] showed that oxytocin and dopamine combine in prairie voles' pair-bond formation, while Dölen and Malenka [40] provided evidence that oxytocin emanating from the nucleus accumbens is involved in social cognition and the response to social cues in humans. Social-based pair bonding is a separate form of attachment based upon separate mode of communication intuitive communication), and its failure results in separate types of emotional and medical problems. The emotional problem is addiction, while the medical problems are those associated with the absence of pleasure or the existence of pain, such as chronic pain conditions. This type of pleasure-based bond adds a quality of experience-pleasure-to the previous bond, which was devoid of any quality except for the intensity of experience. Failure of this bond results in a negative quality-pain-and the motivation to seek the missing quality of life, or pleasure-the goal of addicted individuals. Cooper and Knutson [41] showed why intuition works to generate this pleasure sensation. They found that, if there is uncertainty about a reward, it is more pleasurable when an individual receives it than when the reward is certain. In the peek-a-boo game, when the mother unexpectedly appears, the surprise delights the infant. However, when the mother shows herself to the infant when the infant is hiding, that element of surprise is not present and the game fails. Dürschmid and colleagues [42] showed how the nucleus accumbens works to add this pleasure element to experience by augmenting the input of gamma-wave experience that has been integrated by theta waves. In the fear cycle, the nesting of the gamma waves into the theta-wave context results in contextual learning, while those gamma perception-based waves that were not nested resulted in fear. In this cycle occurring in the nucleus accumbens, gamma-wave perceptions that fit precisely in the middle of a theta-wave timing-wise, created an augmentation of the total experience that was then felt as pleasurable. We all know this experience: when the beat of the music fits just right, it moves us. When it does not fit, it leaves us flat. When our favorite baseball player hits a home run in the ninth inning to win a close game, the timing is perfect, and our excitement is maximal. When he strikes out at that moment, we feel maximal pain. That is why the children of parents who raise them without the spontaneous delight that emanates from surprise but in a rote, by-the-book fashion experience a failure of the pleasure-based bond and are later vulnerable to becoming addicted to drugs, which stimulate the pleasure center artificially. However, this is ultimately futile, since the nervous systems of these individuals adapt to the stimulation, resulting in their needing progressively more drugs to accomplish the same result. Current treatments of drug-dependent individuals are based on their learning to avoid drugs; but this approach does not get to the root of the problem. The major impetus for successful treatment should be to help individuals addicted to drugs develop intuitive-based bonding—the kind they did not receive earlier in their lives. Kahneman [43] won the Nobel Prize for his development of Prospect Theory to explain how intuition works In this theory, he showed how the perceived

stimulus is shown within the context of known background stimuli by the recipient of the intuition. It is the contrast between the inputting stimulus and the background that renders the meaning to the perceiver. When a mother rocks her baby to sleep, she is providing the input while the baby's brain is the recipient of the singing and the rocking motion. If there is an intuitive synchrony, the baby falls asleep, which is similar to the intuitive input that Tronick [34] discussed: if the mother in the peek-a-boo game waits for the baby who is pretending to hide from the mother's gaze, when the baby turns back to the mother, they are both surprised and delighted. The mother, providing the input perception with her gaze at her infant does so at the right timing with her infant's readiness to receive that input. Concerning the baby's brain, when the mother provides her gaze at the right time, she is providing the right input or gamma-wave stimulation to fit into the baby's theta-wave receptive field at precisely the correct time. Using Tronick's [34] example, when the mother spoils the game by peering at the infant when he/she has his/her head turned away from the mother, there is intrusion, missed timing, and a painful as opposed to a pleasurable experience for the baby. The point is, when the mother's timing is accurate, she is providing the gamma-wave input to fit into the theta-wave-based experience of the baby. This produces a marked increase in the excitability of the nucleus accumbens resulting in a large increase in the output from that nucleus of dopamine and electrical activity and pleasure. Levy and colleagues [23] showed that this type of social synchrony showed a simultaneous increase in arousal in both the mother and her infant. This results in the increase in attachment between them. The reason this is important is because the mother's input, through her intuitive resonance with her infant, generates a significantly higher level of neuronal activation than the baby alone can generate. According to these researchers, this elevation, through the input of the mother, is the basis for the nucleus accumbens as a significant locus for mother-infant attachment. It also illustrates, for us, the mechanism behind attachment and perhaps all brain-based attachment. The mother, by providing the correct input for her baby is elevating the level and quality of the infant's experience. In this case converting relatively meaningless patterns of neuronal activity into one which generates pleasure. So, in this case, the mother's input elevates the plane of an experience for her infant from neurobiological to a psychological plane. In this case, into one of pleasure. I will later illustrate how this works in a clinical situation. What makes attachment so unique is the creation of meaning on a psychological experiential plane from what could have just been construed as meaningless neurobiological activity patterns. However, the mode of communication of intuition embodies the brain wave patterns involved in the nucleus accumbens brain region. By applying it correctly, the mother is augmenting the brain waves of her infant at precisely the correct time which causes the development of a new form of attachment between mother and infant, one based on pleasure. The examples from Tronick [34] cited earlier demonstrate this intuitive-based pleasure generation by mother in her infant. The pleasure sharing process is the newly developed form of attachment needed by the infant at a particular developmental phase. When that mode of communication fails, the result may be a form of maldevelopment of the nucleus accumbens which may be the root of a series of psychopathological types known as the addictions.

As described above, the result of intuitive resonance is the generation of neuronal growth and plasticity, the creation of psychological meaning and a sense of security, and an increased connectivity with the mother. Failure of this type of synchrony results in a lack of growth of the brain's neuronal structure in this brain region and may lead the individual to a drug-abuse problem. It also implies that, if we can provide the patient who has this type of problem with an intuitive synchrony experience, this problem may be reversed. The way that the treatment setting can be converted into such an experience can be generated from the neurobiological research just presented. In the peek-a-boo game, when the mother's timing is right, there is an intuitive resonance. Similarly, by adjusting the therapeutic setting by introducing a second frame of reference at just the right time, the therapist can generate the same type of intuitive resonance as the patient needs. In the case below, I replicate this by bringing in his parents, calling them when he needed me to, and other similar examples. When my timing was intuitively accurate, he experienced pleasure he had not previously known.

THE DOPAMINE-DEPLETION HYPOTHESIS OF DRUG ADDICTION

The dopamine-depletion hypothesis of drug addiction [44–47] proposes that drug dependence is the result of the hypo-functioning of the dopamine system of the brain—specifically, as we have seen, in those brain regions associated with the reward system, including the ventral tegmental tract, the nucleus accumbens core, and the nucleus accumbens shell. Drugs of abuse act to enhance dopamine activation, thereby providing pleasure experiences that would otherwise be in deficit. Opiates like heroin act at the site of genesis of the dopamine neurons, the ventral tegmental tract [48], while cocaine acts downstream from opiates at the nucleus accumbens core[2]. Alcohol, on the other hand, is reinforcing further downstream at the level of the nucleus accumbens shell [49,50]. Because an alcoholic's deficit is primarily in the nucleus accumbens shell, the brain region involved in motivation, the alcoholic individual's problem is related to accomplishing his/her goals. That is the basis for the motivation scale developed by Prochaska and DiClemente [51, 52]—the so-called Readiness to Change Scale—that assesses alcoholics' willingness to stop their habit. They showed that, when alcoholics are ready to change, treatment geared to help them implement that change works Currently, the Alcoholics Anonymous (AA) model for alcoholism treatment [53], which is a psychosocial intervention, has very strong support, even though its clinical efficacy has not been borne out by empirical studies [54, 55]. The conclusion of the Cochrane-based reviews of the literature supports AA as helpful in improving adherence to treatment but not necessarily abstinence. However, AA has offered clinical success and hope to many alcoholics and drug-dependent individuals who were previously without resources. Most modern alcoholism-and drug-abuse treatments are based upon the cognitive-behavioral model. Monti and colleagues [56] outlined the basic treatment processes for alcoholism, which includes identifying the triggers for drinking, cue-based exposure therapy (as a means of reducing urges) and identifying the patient as an agent for change. Relapse prevention strategies [57] help the patient identify high-risk situations and learn to manage them. Mindfulness strategies [58] have also been employed using this

model A recent large sample study (Project MATCH) demonstrated the effectiveness of treatments where the severity of alcoholism is high but where there are lesser degrees of dependence. Essentially, we have begun to acquire objective evidence of clinical success with treatment for this group; but the need for new types of treatment that can reach other patients is considerable. In investigating attachment styles and spirituality in addicted and nonaddicted groups, Karimi and colleagues [59] found that ambivalent attachments were more prevalent in the addicted than the nonaddicted group. Similarly, Thorberg and Lyhyers [60] found higher levels of insecure attachment in patients enrolled in addiction treatment programs vs. controls. In a review study, Unterrainer and colleagues [61] found a significant relationship between substance use disorders and attachment failures. Schindler [62] provided a metanalysis of studies strongly supporting a failure of attachment as associated with the genesis of substance use disorders. Thus, there is strong enough evidence of the relationship between attachment failures and drug and alcohol-use disorders to suggest that this is a potentially valuable treatment strategy for these patients Since we know that the nucleus accumbens brain region is affected by drug abuse and alcoholism, it is likely that attachment failure affects the growth and development of that brain region. Since this is the region involved in experiencing pleasure, it is likely that early attachment failure affects the ability of the mother-infant pair to achieve pleasure in their interactions—possibly, as I have suggested, because of the failure of intuition. In such cases, modifying the psychotherapy to include a more intuitive mode of relating could induce the kind of intuitive-based synchrony that occurs in infancy and provide a more natural replenishment of the deficient dopamine. As the case study later in this article shows, this can result in a reduction of drug dependence and an improvement in object relations and overall ability to function—a more substantial resolution of the problems these patients have than what is available currently. Supporting the use of intuition in psychotherapy with drug and alcohol patients, Hansen (63) interviewed a series of experienced drug and alcohol counselors on their use of intuition as an effective treatment modality. Each responded they often used this mode of communication with their patients and strongly advocated its clinical efficacy. Using intuition is becoming a more popular mode of communication that is used in drug and alcohol treatment programs (64-,66), which are based on "harnessing the power of intuition" but none have demonstrated how this mode of communication works to restore attachments as the underlying basis for recovery until now. Programs such as the ones listed above even show how the treatment is based on the restoration of depletions of dopamine (67) in the brains of addicted individuals.

SETTING UP ATTACHMENT BASED TREATMENTS FOR DRUG ADDICTED PATIENTS

In the case history to follow I used set-shifting as the basis for successful treatment. Usually, we value consistency in the therapeutic frame of reference [68, 69] in set-shifting, we have to move between sets intuitively to facilitate this form of attachment For this individual, the set shift involved including family, other doctors, and friends of the patient at certain points in his treatment, as well as communicating with the patient in a variety of ways, all intuitively generated. When the set shift worked, the patient formed an attachment with me based upon pleasure, which set up a pleasure-based frame of reference for experiencing life with other people-a capacity he did not have before. A new motivation system emanating from pleasure replaced the motivation system that led him to seek drugs. As in the previous examples, the success of this treatment was based upon creating an enactment within the modified treatment setting of the problem that originally provoked the attachment failure. By using intuition effectively, I was able to generate a new mode of relating. Once he had developed the capacity for intuitive-based relationships through his treatment, he was able to use them successfully in his broader life.

CASE HISTORY: LARRY

Larry was a 26-year-old single man when I first met him. He had been dependent on opiates for several years and had been to several treatment centers, with no success. He had attempted suicide by taking an overdose of sleeping pills. A girlfriend he had been living with had recently died of a heroin overdose. Larry told me he had taken the sleeping pills so he could join her Larry was the youngest of three children in a well-to-do family. They had tried every treatment they could for him and were at the end of their tether. The most recent psychiatrists he had seen felt he was hopeless because he needed pain killers to cope with his intense reflex sympathetic dystrophy (RSD) symptoms—the result of a motorcycle accident he had in high school. The opiates he took to cope with that pain had started his addiction. Larry was on methadone for the pain but required such high doses that the specialists felt his case was hopeless. They told me that he was so manipulative, he could get anyone to do anything for him. They said that he never told the truth, as his sole life goal was to get opiates for himself (and for the girlfriend who had just died). These psychiatrists sought help from me as a last resort. Larry was brought up in a home that reminded me of Fellini's La Dolce Vita. His parents lived off inherited wealth, and neither was motivated to work. The children and parents were constantly seeking fun, and yet it all seemed false. Larry raced fast cars and motorcycles when he was in high school. Despite his obvious high intelligence, he had no interest in learning, as there was no need to achieve. Even before using narcotic painkillers, he had used alcohol and cocaine with his friends, so his drug abuse was probably inevitable. He went through one relationship after another. Larry was considered the black sheep of the family since all the other children were married and, though they drank and used drugs, they did not use heroin, as Larry did. Despite his very high intelligence and mathematical ability, Larry dropped out of college because of drug use. He then got involved with a woman who was also from a well-to-do family and who supplied him with drugs. His family blamed her for his failure to stop using drugs and sent him to an expensive but ineffective drug rehab program for many months. It seemed even the counselors there never took what they did seriously. After the treatment, Larry hooked up again with the same woman and quickly relapsed. His parents sent him away again to a different program. It was at that program he met the woman who died of the overdose, which led to my working with him. Although the two did many things together, they never talked, and Larry said the relationship was predicated on drugs. At the onset of treatment, Larry appeared highly motivated to get help, which surprised me, given his past

treatment failures and his parents' warnings. He felt his parents and siblings had no respect for him while, in his eyes, they were living empty and meaningless lives. They had put him under "house arrest" at pain of cutting off his inheritance. Larry believed his primary problem was not drugs per se but being the victim of an inbred family in which everyone was seeking pleasure, and no one ever experienced any. He never felt cared-for except if he did exactly what he was expected to do. He described his use of drugs as the only times when life mattered to him. He believed his parents' main concern was that he did not get access to drugs or see his former girlfriend. Larry had no idea what he wanted to do in life despite his considerable talents because he had never developed interests of his own. I believed he really wanted help, despite the warnings of his parents and his history to the contrary; but he had no way to connect with me. There was no real alliance between us. I felt he was trying to be what he imagined I wanted from a "good patient." But ours was an unreal, forced relationship, and we were not getting anywhere. I had to find a real basis for an alliance with him. I started to use my intuition by shifting sets—seeing him in one set, then advocating for him in another. For example, at one point, he needed me to visit with his parents; at another, I spoke with a neurologist he had consulted about a new treatment for his RSD; later, I spoke with him on the phone, because he was "imprisoned" by his family. At yet another time, he asked me to see his girlfriend, which I did because I felt doing so would support his treatment. Instead of seeing the treatment setting as fixed, I used my intuition to shift sets according to my sense of what worked to connect with him. In a sense, I was doing what the mother did in Tronick's [34] description of a young child trying to grasp an out-of-reach toy. I used my intuition to move the toy closer so he could reach it. That was what his parents never did for him. I began to joke with him, using my intuition as a means of connecting, an approach like that used by Dole and Nyswander [70] with their heroin-addicted patients when they developed methadone treatments for them. They would play "cops and robbers" with these addicted individuals, since they intuitively knew that would engage them in a relationship. I did the same with Larry. I intuitively responded with some indignation of my own about his father's cavalier response. I do not usually respond demonstratively like that; however, although it did not fit my usual role, I wanted to establish a mode of relating to Larry based on intuition. When his mother asked him to mow the lawn, even though he had severe back pain, I instinctively became upset with her for asking that of him. Larry greatly enjoyed our intuitive synchrony. He described having to wait many hours when he went to see a prominent neurologist who had a new treatment for his RSD-based pain. Larry told me he felt the doctor was a "pompous ass" and asked me to speak to him to see if I could get him to modify his approach. I intuitively felt calling the doctor was a good idea, and I agreed. Far from being open to the reason that I phoned, the doctor used the call to tell me how hopelessly addicted to opiates Larry was. When I shared with Larry my experience Larry jumped for joy. That was exactly how he experienced the doctor. I told Larry I understood why he felt that way. We were connecting in a way that felt pleasurable for both of us.

In one session, he was very quiet. Without knowing exactly why, I had a strong sense he was about to attempt suicide, because life had become impossible. His mother was about to leave town for a long trip, and based on my intuition, I called to warn her. When she returned home that day, she found Larry lying on the floor, comatose. She rushed him to the hospital, where I saw him the next morning. When he became lucid enough to recognize me, he became furious and fired me on the spot for "blowing his cover and saving his life." Yet, it was clear that he was also thrilled to see me. Our attachment bond had broken through his life-long fog. It was a moment of pleasure that both he and I felt. It was real, in contrast to his usual life of false pleasures. When I saw Larry on subsequent days in hospital, he introduced me animatedly to his girlfriend. I got an intuitive sense of how important their relationship was. It offered the keys to his future, I thought to myself. He told me she had stopped her drug ¬use; but his parents still refused to allow him to see her, and being trapped in his house like a prisoner, he said, was no longer tolerable. This fitted with my intuition, and I decided I would advocate for him with his parents. I invited his parents to my office and suggested that they allow him to leave his house to be with her. They were shocked. Since they had absolutely no intuitive feel for their son, I could not explain why I felt the way I did. But I had just saved his life so my credibility was very strong, and they agreed to try it. Larry was ecstatic. He was sharing real pleasure. We now had a genuine attachment instead of the false one with which the treatment had begun. This was the first time Larry felt he had a real connection to his therapist—probably, he confessed, it was the first time he could really attach himself to anyone. Although the relationship with this girlfriend did not work out over time, it did enable Larry to leave his house regularly and rejoin peer groups. When she told me she was off heroin and Larry later discovered this was a lie, he broke up with her of his own accord. I talked to him about his goals in life, and he himself made the decision to avoid drugs. I believed him when he told me he did not do the drugs. I felt his relationship with me was so strong, he had to tell me the truth. We started to work on helping Larry build a life with real pleasures emanating from his relationships with others. Drugs had created a false life, he told me, and he had discovered he could have a real one instead. He began to speak about returning to school to become a psychologist. He created a garden and grew beautiful flowers and took pleasure in it. He replaced drugs to a significant degree with relationships he enjoyed. He took our work together seriously and began to have real motivation. We sometimes had joyful sessions poking fun at his parents, friends, and other experiences he had. The treatment experience was pleasurable for both of us. This was what replaced the dead, meaningless, drug-abuse-based pseudo pleasures.

CONCLUSION

Since Bowlby developed the concept of attachment, it has signified the development of a secure base for infants through their attachment with their mothers. However, prior to now, no one has articulated the basis for neither that attachment nor how it can be reconstructed in psychotherapy when it had failed. Evidence from neurobiology research supports that the basis of attachment is the brain-to-brain synchrony between mother and infant. Further, it supports that this synchrony varies depending on the brain region involved and that the synchrony shifts from brain region to brain region in a developmental sequence. This paper presents evidence that the communication between mothers

and infants in the attachment process is owing to a mode of relating in which the brain wave pattern of the mother is communicated through a mode of relating to that of the infant Synchronization of the mother's with the infant's brain wave pattern augments and organizes that of the infant's that stimulates its brain development and makes the meaning of the brain-to-brain synchrony much richer to the infant. In fact, it converts the brain pattern of the infant into one that is meaningful on a psychological plane instead of simply remaining an electrical brain wave pattern. In the case presented, that meaning is converting the neuronal pattern into pleasure. An infant, through his/her attachment to his/her mother, attaches pleasure to his/her connection with his mother. That is how he/she establishes her as a secure base.

To train the brain waves of her infant, a mother times her input to just the right timing to fit nicely into the middle of the theta-wave pattern of her infant. She does this through a mode of communication called intuition. When she sings and rocks her infant to sleep, she is doing this. This paper demonstrates how this process can fail in patients whose parents were not intuitive with them and the result is a deficit in the function of their nucleus accumbens. The result can be drug or alcohol abuse, which is aimed at bolstering the brain activation of this same region. In the case study, I demonstrated that a patient whose parents were not intuitive with him at all resulted in his developing a severe drug-abuse problem and a lifestyle pattern of seeking out but never achieving pleasure. To accomplish intuitive synchronicity with this patient, I had to modify the treatment setting consistent with the process of communicating intuition. I had to introduce a second frame of reference at just the right timing to fit his needs.

At one time, for example, I had to tell his mother, who was leaving town, that she should not leave as her son was about to attempt suicide. It was my intuitive judgment, which turned out to be correct, based on a session I had just had with him. When he saw me the next day in the hospital, although he was experiencing pleasure at human contact that was intuitively and corrected timed, he was apparently enraged with me. However, as a result of this intuitive communication being implemented many times in his treatment, he started to use it in his life and developed pleasure in relationships, giving up his drug abuse. He learned to become attached to me and then to others using this pleasure generating bond in which he learned to use intuition himself. I am proposing that the mode of communication reflects the brain wave pattern in mother-infant dyads, which forms the basis of their unconscious communication, and that this process can be simulated successfully during psychotherapy. Doing so forms the basis of neuronal plasticity generation as a basis for psychotherapeutic change. In future papers, I hope to demonstrate that this basis for attachment extends to other dimensions of experience conducted at different brain levels. Future research is needed to integrate different, expanding modalities of treatment which can further the attachment experience, improving treatment efficacy.

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