

# When Neurobiology meets Psychotherapy: Mirror Neurons, the Social Brain and Group Work with the Addicted Population

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## ABSTRACT

*This paper looks at the implications and roles of mirror neurons and neural integration in social behaviors and group work with the addicted population in a Singaporean treatment setting. It is interesting to note that neurobiology not only influences what goes on within a person's brain but also what goes on between brains of different individuals in a social context. The unraveling of this phenomenon seems especially apparent in a group psychotherapy setting where reenactments within the many transactions between members often get played out in interesting ways. Clinical vignettes within the context of therapeutic group-work with different groups of help-seeking, addicted patients will be explored using many of the theories and concepts drawn from the works of Badenoch & Cox and Schermer as a main framework [1,2].*

## Keywords

Neurobiology, Psychotherapy, Social behaviors, Brain cells.

## Introduction

The discovery of mirror neurons; brain cells that fire in reaction to sensing and perceiving another's action in ways similar to when one is rehearsing or performing the action oneself [3], suggest that human beings are primed or "hardwired" to establish social connections with one another. This breakthrough in neuroscience suggests that in the presence of another, we may be able to vicariously experience what another person is going through in his/her world. There are hence, some suggestions that mirror neurons may play a vital role in interpersonal processes, such as the way individuals recognize each other's subjective states and establish rapport with one another.

## Discussion

### Relating mirror, inter-subjectivity and their influence in within group transactions

This is indeed an interesting finding as it explains, in part, how the addiction patients that I work with in groups are sometimes able to "read" one another's non-verbal cues and predict intentions rather accurately. One example would be a member in a support

group verbalizing that when he sees the facial expression and hears the tone of voice (without even having to go into the content) of another member A sharing, he could somewhat "sense" that A is on the slippery road to a full blown relapse. This member verbalized his fears and concerns for A in this way, "As I hear you sharing about how your day went today, I can't help but feel this scary feeling inside of me which I cannot explain. It is a familiar feeling I get when I am about to start using drugs again. It is not what you say but the vibes you give me when you share." What gets even more interesting is the shared observation of other group members who also started to verbalize how they feel the same way about A. I remember A disappearing from the support group for a few weeks before turning up at our drug detoxification facility seeking for admission as he had indeed relapsed shortly after that evening he shared in the support group. He later went back to the group and shared how he was angry at group members for saying that he was in danger of relapsing, not because he disagreed or felt wronged, but because he felt his deeply seated intentions were exposed. It is interesting how this phenomenon can both be explained using an inter-subjective relational framework and also by the works of the mirror neurons and its mirror systems. From an inter-subjective perspective, it would seem that every member of the group who is grappling with their recovery from drug addiction has parts of

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themselves which they fear or deem unwholesome to acknowledge (e. g. the ambivalence about wanting recovery, the desire to go back to their drugs and the old lifestyle that was destructive but familiar with them and the love hate relationship they had with their addiction). When parts of what another member shared (verbal or non-verbal) resonated with this part of them which they consciously want to disown and split off, an opportunity to project their "bad parts" onto a self-elected container (the member) presents. From a neurobiological perspective, we could also say that it is the mirror neurons at work, allowing group members to sense and know the intention of another because similar neural pathways are activated inside of them when the relapsing member shared his issue. It is fascinating how one could relook at seemingly trivial transactions between groups with so much more insights with the discovery of the mirror system. This amazing capability of members in a group to connect stems from the theory that mirror neurons subsume the intermediate emotional resonance that occurs between people and that they are essential for inter-subjective transactions [4].

### **Forces and common purposes bringing people together in groups**

Bion (1961) also observed and suggested the presence of a special type of force that seems to supersede a more cognitive and rationale level of sense-making existing between people in a therapy group. This, interestingly, is in line with the fact that group members didn't feel a sense of urgency and fear for X because they rationally predicted his relapse based on the content of his sharing (that perhaps he is cutting corners, taking risk in his recovery or verbalizing some perceptions which are compatible to his addictive behaviours) but they resonated with something inside of X that they couldn't rationally describe in words. It is as if people were pre-programmed to cooperate with one another, on a "proto-mental" level, to fulfill some greater purposes together based on their ability to sense, resonate and empathize with one another. These purposes, according to Bion [5], included (1) the need to fight or flee from something, (2) the need to be taken care of by an omnipotent leader or (3) the need to devote themselves to enthusiastic dreams about future salvation from all pains and distress. This is another situation where a theoretical assumption of the social self makes a lot more sense when we are able to link it to the existence of mirror systems (which can include mirror neurons and other parts of the brain). In fact, in the works of Trevarthen & Meltzoff [6,7], there has already been much discussion about the existence of innate systems for matching, synchronicity and imitation that operate from birth and develop throughout life, again, suggesting a parallel between theoretical assumptions and brain research. In very similar ways, Foulkes's [8], idea of "group matrix" where the self (defined by our individuality, autonomy and agency) is paradoxically social in nature also points to the idea that one constantly needs opportunities to superimpose and identify one's own behaviour and self-image with those of another to achieve and form an organized sense of self. As highlighted by Schermer [2], the function of mirror neurons and the mirror systems (which was discovered years later after Foulkes coined the idea of the social self) played a crucial role in the building up of a more complete self within the context of others and society. To push

this a little further, this could also suggest that psychopathology within the self can hardly be understood in its full form and healed in totality without tapping onto a social context in therapy (engaging in group work). Yalom [9], in one of his video vignettes masterfully demonstrated this process through his work with Dan (an emotionally repressed dentist who entered group therapy to work on his marital issues) by getting women in the group to pause for a moment and imagine if they were his wife and how it would be about how absent he was for them. It was interestingly because many female members could almost immediately put themselves in that position and comment about how absent he seems as a husband and how they could foresee themselves having to get louder, shriller and angrier at him just to get his attention and response. This is another attestation to the workings of the mirror neurons where members could sense how Dan's wife would have felt (without having to interact with her) by having the same neural pathways activated from their contact and transactions with Dan. Again, this seems to be on a proto-mental level where it is not about anything that Dan says explicitly to the women in the group that helped them connect at a cognitive level but perhaps about the little nuances of impulses and sensations they gathered from Dan's way of being that may have also "woken up" something inside of them.

### **Shift of stance in group therapy**

Another interesting perspective to take from the discovery of mirror neurons, as suggested by Schermer [2], is the consideration of a shift from the stance of objective distance a traditional dynamic group therapist tends to take to a more mutually responsive attitude that capitalizes on the effect of mirror neurons when working with group. If we subscribe to the idea of mirror neurons, the process of mutual influence is natural and inevitable regardless of how much one strives to maintain professional distance. Perhaps the only difference between the therapist and group members is his/her ability to be more acutely aware of the mirror pathways at work, learn more about the group members during instances where he/she could identify and resonate with them and perhaps engage in appropriate self-disclosures when it is in the service of the group members.

On a group level, I have observed similar exchanges when a zealous lady Z was first joined a gambling support group that I run. I remembered hearing another more senior member (who have been attending the group for 2 years) talk about how much the group had supported and benefitted him in these 2 years and was always able to get back on track rather quickly despite the multiple relapses in between. At this point, Z retorted by saying, "You are clearly contradicting yourself! If the group is that great and useful, why are you still relapsing so often in between!". At this point, the first thing that came to my mind was how terrible and embarrassing this senior member must have felt being lashed out at and contradicted when he was just trying to help and be supportive. He certainly didn't deserve this. Before I could respond, I started to also experience a sense of confusion which Z may be experiencing as a puzzled newcomer who cannot understand how a good recovery can well be relapse laden in between. I ended up doing a double sided reflection, taking about how the group can

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be a great source of support to guide members back on track if they experienced slips in between and also how confusing it must have been for Z to hear that people can still relapse despite being in a group that is beneficial and supportive. I also used an analogy about the a newcomer in a slimming center asking a more senior member why he was still overweight, if the slimming center was indeed effective, and asked the group how the more senior member would have felt. Z was then able to relate her tendency to be caustic and challenging when her husband attempted to be supportive and it seemed to her like a safe way to deal with her fear and confusion when she is struggling with difficult situations in life.

On hindsight, with the understanding of mirror neurons, this whole process can be seen in a different light, starting from how my mirror systems may be activated when I was able to resonate both with how Z and the senior group member must have felt when those transactions happened. Through the use of a less threatening analogy, it seemed to help Z empathize with how the senior member must have felt when she lashed out at him the way she did and she was somewhat able to take it a step further to reflect upon how her own husband must have felt when she pushed him away during the times when he tried to help and be supportive to her. In the words of Schermer [2], like it or not, with the presence of mirror neurons, the therapist is non-consciously resonating with the group, cannot avoid doing that, and may well achieve more therapeutic crutch working from the “inside”, utilizing his/ her natural responses to influence the group. Looking back at the group, as a therapist, another route which I may consider taking would be to disclose about my own responses (physiological, emotional and cognitive) to Z when she lashes out at the senior member and to encourage the rest of the group members to open up and disclose how this particular transaction make that feel and if they, like Z and the senior member of the group, had been in similar places before outside or within the group. Schermer’s [2] idea that a skillful facilitator needs to move adeptly and flexibly between the position of the detached analyst that maintains professional distance and the role of someone who could also be influenced by the actions and vibes other members emit (being able to switch roles between both he experimenter and the money in the language of mirror neurons) is in line with the idea that there is a need for the therapist, at times, to manifest an unreflective aspect of their patients’ self-systems as coined by Spontitz [10], as the process of “joining” and by Lichtenberg [11], as “wearing the attribution”. They would, from time to time, allow the group members find a mirror in the therapist so as to feel more understood and connected. It was also fascinating to note that the effect of mirror neurons can cut both ways as illustrated in the example of Joe [2]. Joe’s tendency to engage with group members in a passive and detached manner was eventually mirrored by the rest of the group members who started to speak to him without emotions which eventually led to his dropping out of the group.

This brings back memories of a similar experience with a certain member, M, in gambling recovery support group I ran some years back. M appeared to be doing well in his recovery, sustaining abstinent from gambling and keeping his distance

from situations (people, places and things) that could possibly endanger his recovery. All seemed to be well except for the fact that M appeared to be perpetually negative about the happenings in his life whenever he shared in the group. He will talk about how he was doing the things he was doing, how he sees his debts decreasing bit by bit but how much his life “sucked” without gambling and how he has to accept the painfully fact that he would never ever be able to enjoy the one thing that used to give him so much meaning and happiness in his life. He sharing often ended on a dark and gloomy note, making recovery sound very much like a chore that he simply hated but had to persevere for some reason. Initially the group members responded in a supportive fashion, acknowledging the fact that he is trying despite the difficulties he faced but as sessions went by, some members got frustrated with him, telling him how demoralizing his views can be while others began to identify with him and agree that perhaps long term recovery is not worthwhile working towards and that the light that they wanted to see at the end of the tunnel is nothing but an illusion that will never materialize. Like Joe, M eventually dropped out of the group and mentioned to his individual therapist that he doesn’t see the value of continuing his group sessions because the members who couldn’t identify with his views about recovery found him a nuisance and a barrier to their desire to stop gambling while the other group who resonated with him made him feel more demoralized and disillusioned with recovery as they verified his views that his life will never be meaningful and he can never be salvaged from the sufferings that he is grappling with now regardless of whether he chose to continue to gamble or not. He also reported feeling physically and mentally drained during those sessions and he refuse to partake in such an exhausting and unproductive process again. This may be a situation where some members of the group (those who found M an irritant) felt upset after listening to M because his sharing, mannerisms and way of being mirrored and represented the unwanted parts of themselves which they may have fear and anxiety acknowledging. Many of them may, deep inside on a non-conscious level, resonate which M’s reasoning that life would never be the same without gambling and perhaps there is not one thing in this world that can give you the thrill, the rush and the adrenaline that gambling gives you. The other members who resonated with his views also had their mirror systems activated in a more direct way, being able to empathize with M’s negativity and fear that life can never be good again and the futility of continuing to work so hard in their recovery as it would only lead them to a path of unhappiness.

With the understanding of mirror neurons and inter-subjectivity, and again on hindsight, a possible intervention would be the therapist highlighting the ambivalence verbalized by M (the fact that he is feeling bad about not gambling but he is trying his best to stop at the same time), acknowledging it and perhaps going a step further to normalize this by getting other group members to share a little about the double-sidedness they can often feel about their recovery. If the therapist feels comfortable enough, he may also want to self-disclose about the times in his own life where he feels two-minded about things and how that feeling is more like a normal phase in life which can be perceived as a safe stepping stone rather

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than a disastrous process in recovery. In this situation, the therapist now switches to the role of an experimenter, modeling a stable predisposition to the mixed feelings about recovery in hope that the rest of the members (the monkeys) will mirror this and internalize this equanimous view and response to uncertainty and discomfort. In this situation, as mentioned in the earlier parts of this paper, it also seems to be also in line with one of the three ultimate purposes of people in groups (to be taken care of a competent leader who may be capable of, in this instance, modelling appropriate and adaptive reactions to conflicting feelings which may be difficult and comfortable to “sit with”) as highlighted by Bion [5].

### **Resonance: Recognition of self into others and vice-versa**

The other interesting point brought up by Schermer [2], is the idea that mutual attunement in groups encompasses the recognition of self in other and the recognition of other in self. He went back to the discussion of the group therapist taking a detached stance, sharing abstract observations about the group being a not so effective way of relating at the early stages where the members have not achieved a sense of attunement and rapport with the therapist. The example he provided about how the group of men and women who experienced troubled relationships was enlightening as it clearly highlighted the differences in therapeutic leverage when the therapist attempted to do abstract interpretations (trying to highlight parallels between intra and extra-group interactions) based on what he observes as compared to when he attempted to move in a more mutually attuned stance, getting inside what members are feeling in the present moment. Using the same example in the gambling support group I run where members are split between how they feel about their recovery (feeling hopeful versus meaningless), an alternative of engaging the group as a facilitator would be the use of mirroring statements like, “I find that I feel a little confused about what has been going on. On one hand, I feel happy over the fact that some of you are enjoying your recovery and it makes me feel like what we have been working on so far has been worthwhile. On the other hand, I also feel frightened and frustrated over the fact that despite the best of intentions to want to get better, we battle with a baffling disorder that makes us feel miss the “good old days” we experience when we are on a roll in our gambling. I wonder if there are others who feel the same way.”

This approach, as opposed to an attempt to make abstract interpretations of the ambivalence may allow the leader create in himself a mirror of what may be co-occurring among the other group members [2], facilitating mutual attunement and cohesion if other members subsequently take cue and continues to model the leadership’s behaviour/ ways of engaging. Coincidentally, Schermer [2] mentioned addiction support groups like Alcoholics Anonymous exemplifying the creation of the “We-ness” feeling, where members readily recognize and resonate with something of themselves in each other, making them feel less isolated and lonely, bringing closer to work towards a common purpose of freeing themselves from the shackles of addiction. This interestingly also coincides with the third common purpose (the need to devote themselves to enthusiastic dreams about future salvation from all pains and distress) that brings people together according to Bion

[5]. Schermer [2], also adeptly used the analogy of leaders like Mahatma Gandhi, Martin Luther King and Nelson Mandela to illustrate the style of conducting group therapy where the therapist is willing to move in and out, oscillating between positions where he maintains objectivity to see the larger scheme of things and a more rational picture and positions where he “walks along” with group members, allowing himself to immerse into the group process.

### **Implicit memories and the relational world**

While Schermer [2], has provided an extremely comprehensive overview of the role of mirror neurons in groups, Badenoch [12], and Siegel [13], added another dimension to our understanding of the mirror systems by looking at implicit memories (encoded in the form of bodily sensations, behavioural impulses, emotional surges and perceptions of safety or danger) that are formed from early experiences in one’s life (birth to 18 months). When repeated, these experiences organize into models or schemas that colours one’s perceptions of the relational world around them. These processes unconsciously influence the way we approach relationships [13-15], as they are stored in the right hemisphere and operate in adulthood in emotional interactions. When placed in a group, these ways of relating to people often re-enact, forming a microcosm of what goes on in their social world.

From these findings, we may deduce that mirror systems and neuronal connections are not just passively shaped by observing someone else’s behaviours or resonating with someone else’s intentions. The way mirror systems get activated also seems to be highly dependent on the early critical experiences that shape a person’s neuro-circuitry. This reminds me of a patient C who had the unfortunate childhood experience of being given away by her parents (she was the product of an unwanted pregnancy in her words) to the care of her aunt. She always remembered being treated like a liability in her aunt’s family and that she had to subjugate her wants and needs in the service of everyone else in the family to repay the debt of gratitude. Her self-worth hinges heavily on how much she is accepted by her aunt’s family and she eventually came to believe that the more she sacrifices for the gain of others, the more she is perceived as a worthy person. This is in line with idea that her early experiences (receiving signals of rejection and abandonment from her caregivers) before 18 months old somehow gets registered as bodily sensations, emotional surges and behavioural impulses which repeated get reinforced till they become important mental modes or life themes for her. These early memories are likely to be implicit and unavailable to her conscious awareness, resulting in her tendency to react in certain ways in specific situations because it seems to her like the only way she knows how to respond. These tendencies strongly surface in the dissatisfactory relationships she had with people around her (her husband, children, friends, colleagues) where she often finds herself feeling drained (both emotionally and physically) over the belief that nothing she does is enough or good enough to be appreciated and loved. In a group setting, she often views her disclosures as unimportant and a waste of the group’s time and would get extremely apologetic for taking up the airtime that does

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not rightfully belong to her.

### **Groups as the safe holding ground for unfolding implicit memories**

One of the strengths of being in group therapy is the high likelihood that the neural networks triggering early implicit experience will be triggered as members bring their struggles into the group [1]. If C is encouraged to share her struggles and pain of having to please people all the time in order to feel worthy and her deeply seated fear of abandonment (which may be implicit to her in the beginning), the group, if well-facilitated, can provide an empathy rich environment (with the blessings of mirror neurons) for holding the pain and fear that emerges. When other members began to exhibit attunement and compassion towards her, C is then presented with an opportunity that facilitates the rewiring of her limbic regions into patterns of secure attachment [15], and to feel safe in a supportive environment that allows her implicit memories to surface in its emotional vividness and become available on a conscious level (explicit memory) for transformation [12,16].

It is therefore interesting to look at possible ways to better facilitate the process of making implicit memories conscious and explicit so that they can be available to adaptive transformation. Badenoch & Cox's [1], suggested both the therapist's holding capacity and the group's mindful awareness of their own inner worlds, as well as their empathic awareness of others, as important qualities that can enhance the above process. There seems to be parallels between this group process and it can be helpful to the process of using exposure therapy to treatment patients suffering from phobias or PTSD. The principles of re-experiencing the disturbing stimulus/episode, response prevention (restraining patients from utilizing old, unhelpful coping mechanisms) and emotional regulation (through the use of relaxation therapy or eye desensitization techniques to bring able emotions that are incompatible with the original ones which are often disturbing) in a safe environment, though not completely identical, sheds a lot of light on the therapeutic value of other members (in well-established group) responding a member's implicit memory unfolding by maintaining a calm, inner state to regulate the intensity of the emotionally charged and to provide a refreshing and reassuring experience that can permanently modify the implicit coding [1].

In the realm of mirror neurons, this is possibly a process where well-regulated members can resonate with the experiences of a member struggling with the unfolding of an implicit memory yet maintain the calm and equanimous internal states to provide a "template" for the member to mirror and internalize new and adaptive emotional responses in face of behavioural impulses, emotional surges or bodily sensations. In Badenoch & Cox's [1], words, group therapy can provide the safe environment that allows dissociated implicit memories to be held in kindness long enough to find integration into explicit awareness.

### **Achieving Neural Integration**

The term neural integration helps us understand (1) how our brain functions as a complex, self-organizing systems that seeks to

constantly link differentiated brain circuits (as a result of various daily experiences that we come across) into a coherent whole [13], and (2) how implicit memories can potentially derail this process (bringing about neural disintegration) when they result in the secretion of stress chemicals and protective dissociation that subsequently blocks the linkages between the amygdala and the hippocampus. This gives us greatly clarity as to why implicit memories seem to have such an "unconscious" and "uncontrollable" effect on behaviour and conscious choices [1], bringing about overwhelming feelings of helplessness. It is almost as if when one is exposed to certain stimulus, he/ she cannot help but be "hijacked" by a "short circuit" causing a malfunction or breakdown in the larger system.

On an intrapersonal level, intrapersonal neural integration can take place when we allow one part of our mind to observe and care for another part of the mind [12]. This seems to be referring to need to become mindfully aware of the emotional surges, behavioural impulses or sensations as they manifest in a gentle, kind and non-judgmental way. The findings seem to suggest (and I assume) that the more we can compassionately attend to these implicit "manifestations", the more they can become available for explicit transformation. Siegel [17], adds another important social dimension to this by look at how we can advance from intrapersonal integration to interpersonal integration by turning our kind attention towards others who are struggling with neural-disintegration (hijacked by their implicit memories). This again point towards the potential benefits of being emplaced in group therapy where there could be plenty of opportunities for interpersonal connection, to activate this therapeutic "dance" of neural circuitries between members (as they trigger, mirror and influence one another) eventually bringing about good degrees of neural integration.

The example of James [1], reminded me of the story of a patient, R (told to me by a senior colleague years ago). R was in a skilled-based, CBT group for recovering gamblers and my senior colleague was the therapist leading the group. My senior colleague has a habit of cracking his knuckles periodically when he was facilitating (and he perhaps wasn't even conscious aware of that) and he noticed R cringing and looking rather disturbed and uncomfortable whenever he did that. When he notices that happening consistently for a few times, he decided to verbalize his observation to R. He did it in a kind and empathetic fashion, asking if the noise he made with his knuckles was distracting or uncomfortable to R. The rest of the group members shared that they were mildly distracted by the noise he made with his knuckles but shared the observation that R was visibly more disturbed by the noise. In jest, they shared that R seemed allergic to the noise of knuckles cracking and that my colleague should be careful about not triggering that allergy. I deduce that the group must have, in general, responded to R's bodily reaction to my colleague's knuckle cracking in a compassionate and empathetic fashion, resulting in R eventually (after 1 to 2 sessions later) being able to link these implicit reactions to how his own father used to crack his knuckles before giving him a beating whenever he misbehaved.

In small ways, there seemed to be some parallels between how James and R in how their implicit memories surface to explicit awareness in a safe, nurturing and compassionate holding environment provided by the group. This seems to be an interesting depiction of how a dissociated implicit memory (R knew he was uncomfortable when he hears the sound of knuckles cracking but he did not know why he felt uncomfortable as he does not have narratives to tag to these sensations) comes out of isolation into awareness, and can be first embraced by the hippocampus (where R starts linking sensations to explicit memories as he “remembers” his father cracking his knuckles before giving him a beating) and then by the integrative fibers of the middle prefrontal cortex (did not happen with R yet but can potentially happen if R is able to link these early experiences to relationships he had with people around him and draw parallels inside and outside of the group setting). Once such an integration process is established, R may become more resilient in face of similar stress conditions that potentially triggers his limbic systems again. The other interesting area look at is the possibility of increasing group members capacity to be compassionate, empathetic and be at peace in face of their own or other members’ emotional turmoil as implicit memories begin to unfold is the possibility of training and practicing (both the members and therapist) mindfulness meditation/ exercises within and between group sessions creating an environment of peacefulness, calm and stability that continues to sustain as members keep mirroring these responses and qualities everyone has attempted to inculcate.

## Conclusion

Many key points have stood out for me in the process of understanding the link between mirror neurons / mirror systems, the social brain and the neural integration. It is intriguing to note that we are neurologically wired to connect with one another and our systems are designed to help us vicariously experience the actions, intentions and emotions of another person we are in connect with. The concepts related to neural integration also helps us see how predisposing early experiences play a crucial role in shaping our circuitry and how our mirror systems work, giving a lot more depth to understanding the process of how painful, seemingly uncontrollable impulses from the implicit can be reprocessed and healed explicitly in groups. Being able to relook at previous transactions in my own group work with patients through the lens of the mirror systems and neural re-integration was extremely insight provoking as it has strong implications on future group practice.

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