**Lecture 7: Dynamic unconscious revisited**

Description: Levels of emotional awareness, affective agnosia, 3-process model, integration of conflict and deficit models in Operationalized Psychodynamic Diagnosis (OPD).

Today we are going to talk about clinical manifestations of lower emotional awareness and integrating with the defense and deficit views. We'll start off with this first section talking about defense and deficit perspectives on lower emotional awareness. Defenses can be classified as mature and immature. Immature defenses are hypothesized to involve a deficit in mental representation capacity. For immature defenses, the deficit and defense accounts may be different versions of the same thing. After that initial section, we will then talk about the neural basis of mature and immature defenses. We're talking about imaging evidence about repression, which is mature events, and then information I could find relevant to 4 types of immature defenses such as dissociation, de-somatization, splitting and projective identification which are also associated with lower emotion awareness. I will try to convince you that a computational neuroscience perspective may be helpful in reconciling disparate conceptualizations from a psychological perspective.

Psychodynamics fundamentally refers to the influence of unconscious mechanisms on behavior. Something can be unconscious because it is actively kept out of awareness, and that's defense. The other option is that mental contents fail to reach conscious awareness due to a deficit. You fail to construct the experience. I am going to propose 3 propositions or theses here. Number one, the critical issue is whether something has been previously mentally represented / constructed or not. Second, for immature defenses, defense (motivated avoidance) and deficit (impaired mental representation), may be one and the same. Thesis three is defenses are more likely when deficits are present. What's the concept of defense? It's motivated avoidance of an undesirable internal state. The state has typically been previously mentally represented and can be recognized as threatening. Unpleasant emotional arousal. either activated or late in potential triggers avoidance. Traditionally, a defense is deployed by the ego which mediates between drive demands and requirements of the external world. How the ego decides what to do is unclear. Someone can find an explanation in the psychoanalytic literature as to how the ego does it, I would really like to see that. Mature defenses involve the ability to mentally represent an emotional state that is not acknowledged. Someone could say, I'm not upset about such and such for this reason. What is not experienced is well defined. They are denying being upset and they explain why. Some examples of mature defenses would be rationalization, intellectualization, displacement, and isolation of affect. I will give you some examples in a minute. If the defense is overcome the emotion can be acknowledged. I'm proposing that for immature defenses they involve failed mental representation. Examples are dissociation, somatization, splitting and, projective identification. If the defense is overcome in the case of immature defense, the emotional state still needs to be represented or formulated, which requires special intervention. The question was, what difference does it make? There is more to do when the defense is overcome, and moreover, you may have to help with the formulation and the representation before it can be overcome. What are mature defenses? Intellectualization: Dealing with emotional stressors by excessive use of abstract thinking or complex explanations to minimize disturbing feeling. For example, person A is rude to person B and person B thinks about the reasons for person A’s behavior. That's what therapists do, we intellectualize. Rationalization: Dealing with emotional stressors by inventing a socially acceptable or logical reason to justify and already take an unconscious emotional action. An example would be someone doesn't get into their dream college, and they say, I like the college that I got into. You know it's more welcoming and friendly environment. In other words, not acknowledging the disappointment of not getting into where they want to go. Repression: Moving thoughts that are unacceptable to the ego into the unconscious, where they cannot be easily accessed. A common example would be a person had a bad experience in childhood. and it may be forgotten, vanished from awareness, as if it didn’t happen. Displacement dealing with emotional stressors by redirecting emotion from a dangerous object to a safe object. You might be angry at the boss but kick the door. Isolation of affect: dealing with emotional stressors by splitting off the emotional components from a difficult thought. For example, describing the day your house burnt down in a factual way, without any display of affect. Now, what about immature defenses? Dissociation: a mental process that disconnects from one's thoughts, feelings, memories, or sense of identity. For example, feeling numb, not being able to think clearly, losing track of time and finding myself and my surroundings without knowing how I got there. Somatization: That's the presentation of emotional distress in the form of somatic complaint. it's considered an immature defense. I will try to make the case that it's associated with impaired mental representation of emotion. Splitting: splitting off, and rejecting parts of the object image, or part of one's own body. This is most typically associated with borderline personality, disorder. This has to do with idealizing someone or undervaluing someone, switching back and forth, but not integrating the two. Finally, projective identification. Projection is when you attribute a disowned aspect of yourself to someone else. For example, I’m not angry, you're dangerous I am afraid of you. Bring anger to the other person. Then you feel not aware of your own anger. Projective identification is when the other person takes on the disowned emotion, so the person becomes angry at you. Understand the difference there, and that's very common and borderline personality disorder.

I previously mentioned the reprocess model of emotional awareness. In all these cases we're talking about a process 1 in affective response, particularly emotional distress that has been activated. I am arguing that with immature defenses, you have an impairment in process 2: affective response representation. With mature defenses the capacity for using the process 2 and 3 are available, but they're not used in this context. Here's one way of beginning to think about the difference between defense and deficit. A collage of images of a person lifting a barbell

Description automatically generated On the left-hand side, we have unearthed a buried treasure. This is defense. It's been previously mentally represented. Remember, Freud had those little figurines or buried treasures that are representing what's in the unconscious. You're actively hiding something old, and you're bringing it to the surface. What about a skill deficit perspective? You're finishing something that's incomplete. It has not been previously mentally represented. You're formulating something new and you're bringing it to a higher level. There are some differences in assumptions and perspectives from these 2 perspectives. Regarding defenses, and remember I presented these 2 different models, the Solms Paankseft model and the constructionist model. This would be the more Solms Paankseft model that all humans share the same basic emotion capabilities. Experiences vary as a function of the defenses used. People vary in the maturity of the defenses they use to avoid emotional pain and pervasive use of immature defenses results in limitations and adaptation and clinical dysfunction. From a skilled deficit perspective, say that rudimentary emotional responses are inborn, but the capacity to make sense of and experience emotions is learned. Emotional awareness is a cognitive skill or capability, and people vary in the development of the skill or capability. This developmental line, bridges normative and clinical domains.

How can we bring these two together? Well, I would like to put forward the idea that a computational perspective could be helpful. It starts off with this basic premise that perception and action are interrelated. The way we perceive situations influences the action options available. The actions we select influence what we perceive both interoceptively and exteroceptively. Actions consist of overt behavior or cognitive actions. Before an action is selected the sensory consequences of a range of options are anticipated and the computation is performed outside of awareness that weighs these options to determine what action should I take. The action selected in each circumstance is determined by consideration of two factors: One is instrumental, and the other is epistemic. These mathematical terms determine which actions have the highest value and the lowest expected free energy, or least likely to produce prediction error. The instrumental term involves maximizing current positive emotion by minimizing the deviation between expected and preferred outcomes. You're going to select an action that's going to make you feel good and you're going to have a prediction about what the action will result in. There may be a difference between what you expect, and what you prefer. You could try to minimize that difference. You might contemplate doing something that is not very desirable and that's what you expect will happen. But if it is not as bad as you expect then it might be preferred. The epistemic term is where you want to maximize the information gain which increases your confidence in which future actions will lead to preferred outcomes later. We don't just do things because they're going to feel good. We might also do things out of curiosity or interest. The way of understanding that is its going to give us more information. It's not just necessarily random information, it might be information that will help us achieve preferred outcomes later. I use the example previously of how a therapist might encourage someone to get out of their comfort zone and do certain things to counter prior expectations, and they might have better experiences, and that might increase their range of function.

Taking these two terms into account, there are differences in low versus high emotional awareness in the tendency to attend to emotional experience versus avoid or defend. The nature of the experience is not the same if you're a low emotional awareness person versus high. If you have low emotional awareness, you have impaired mental representation capacity. Well, we talked previously about how that may result from early adversity, abusive neglect. You have a fast life history, strategy. Your ability to project into the future is limited or more limited. If you think about the possibility of attending to your unpleasant emotional state, you're not confident that preferred outcomes are possible, focusing on negative emotion is expected to have a bad outcome. Therefore, the difference between expected and preferred outcome is too large and therefore someone with low most awareness might choose a short-term action that will minimize the difference between expected and preferred. It might involve consuming foods that might be not good for you, taking substances, impulsive actions, etc... What about for a higher emotional awareness person with intact mental representation capacity when they're contemplating the possibility of focusing on their own emotions and emotional distress? Well, they have a longer time horizon, and they're better able to balance short and long-term needs. The preferred state includes the future as well as the present. Focusing on negative emotion is more likely to be balanced by positive emotion because they have higher emotional awareness. Greater capacity for experience focusing on negative emotion means now they have a payoff in the future. attending to negative emotion is less unpleasant and more likely helpful.

What can we conclude regarding the role of mentalization impairment and avoidance and defense? The issue is whether all instances of lack of awareness can be completely explained by defense. It may be the defenses may always be present, especially if deficits in mental representation exist. If someone is highly aware, and they have a large repertoire of emotional concepts which are pure defenses if present are easier to overcome. The perspective offered here is that immature defenses involve deficits and mental representation, overcoming immature defenses is more difficult, and once immature defenses overcome need to help patients formulate or construct experience in the problematic context. Immature defenses and failure of mental representation may be different accounts of the same phenomena.

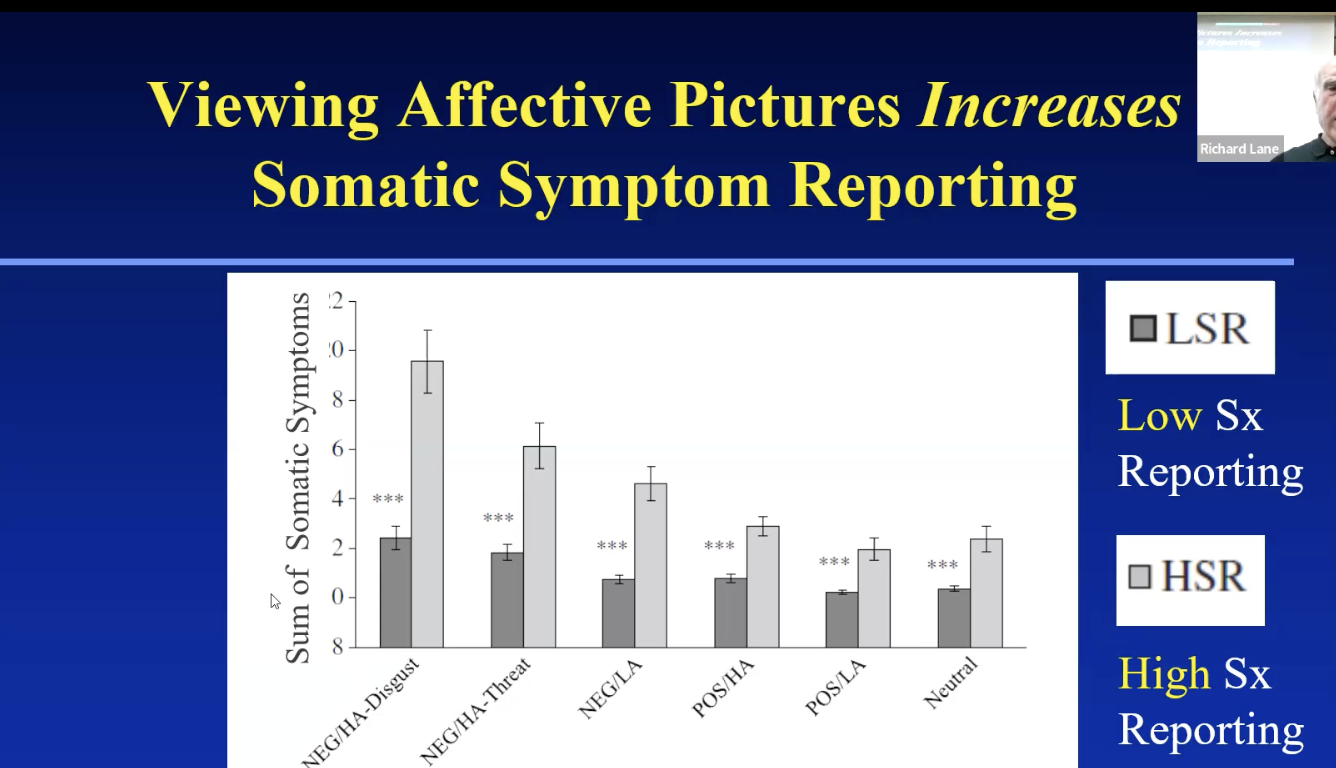
A black and white image of a person

Description automatically generated I want you to look at this familiar picture and remember what it was like when you first saw this and you didn't see the corresponding photo to know what this is all about. I would say that in the first time you see it, it corresponds to a state where you don't have a mental representation. The experience is incoherent. Avoidance, not focusing on it, is likely. In the constructionist account, emotion that is not mentally represented is diffusive, differentiated, and may be unmanageable. It can be sensory, and you can quickly steer away from it. Not well-defined. However, if a person can mentally represent. then thinking about how this picture looks, knowing what it corresponds to, and you can make sense of an emotional experience. They're more likely to experience an emotional feeling and not defend against it. The conclusion, then, is that defenses or other avoided strategies are more likely to occur when mental representation deficits are present.

I'm going to talk about repression as a mature defense. And then we're going to talk about 4 examples of immature defenses from a brain-based perspective. \*Question. The question is, if someone does not have a mental representation, do they have the emotion or not? They have the affective response generated in the body. Meaning they have the physiology and the behavior, but they don't have it constructed as a discrete feeling state which would require a mental representation or conceptualization of that bodily state. The emotion has no label and it's more like this weird picture. Do I believe that could be learned? Yes, I do. It's not easy, and that's what we'll be talking about in the next couple of weeks and next couple of sessions. In terms of learning emotional awareness there are ten studies that show that it can be taught, and people can improve in their emotional awareness. It is typically learned in most cases during normal development, through mirroring, empathy, and contingent responding. You come to know that your bodily experiences have meeting, and you can attribute emotional meetings, and you understand what emotions are and what they can tell you, and how they're useful.

Ok, repressive coping style. The repressive coping style is associated with a tendency to focus on positive emotions and disregard the negative. It has been linked to adverse health consequences. A study that I like from 50 years ago investigated patients in the intensive care unit who had a mild cardio infarction. They found that if the patients were repressors, they did better in the short term in the ICU, compared to non-repressors. However, in the long term they didn't do as well because they didn't stop smoking, and they didn't go to rehab and do the things they needed to do which required acknowledging that there was risk. Karen has done on an important study of breast cancer patients showing that in women who recently were diagnosed as having a metastatic breast cancer and a 3 year follow up for the women who had a repressive coping style didn't live as long. There’s something about not attending to your emotions that can compromise your health. The degree of impairment in emotion processing isn't quite as severe as an immature defense. Evidence supports a vigilance avoidance theory of repressive coping such that these individuals are highly attentive to negative stimuli, but then withdraw attention very quickly and curtail further processing to reduce arousal. This is consistent with the concept of defensiveness. The negative effect is mentally represented but then it is excluded from conscious awareness. There isn't a lot of brain imaging work on repression or repressive coping style, but I was able to find a couple of studies from the same group. Repressive relative to sensitizers show reduced amygdala responsiveness and greater prefrontal modulation to fearful faces. The Mainez coping inventory was used to identify repressors versus sensitizers. Sensitizers are people who try to gather as much information as possible to reduce uncertainty about the situation. This was in an older era, when 10 subjects in each group was enough for an imaging study. The repressors showed weaker amygdala responses to unmask their full faces than sensitizers. That pattern was associated with greater covariation with prefrontal cortex consistent with a top-down inhibitory influence. Here's a follow up study 7 years later within the same group. Repressors show stronger cortical activation during encoding of threatening stimuli relative to sensitizers. This is showing between group differences and brain response to angry facial expressions compared to neutral facial expressions. These are brain areas where repressors had more activity in this difference relative to sensitizers. This is appropriately corrected for multiple comparisons. There were 20 in each group, which is getting closer to what's acceptable now. The repressors showed stronger cortical responses to encoding angry versus neutral faces and sensitizers which confirms the assumption of heightened processing of threatening stimuli at an early processing stage of repressors.

Now we're going into the immature defenses. We're going to deal with dissociation. I found a paper by Ruth Lanius, who is an expert in this area who describes two distinct sub types of Ptsd. One that's under modulated which is typical of PTSD, and over modulation. The dissociative subtype is characterized by over modulation of affect. Well, the more common under modulated type of Ptsd, involves the predominance of re-experiencing and hyper arousal symptoms. I would propose that there is a mental representation impairment in both but here we're focusing on emotional overmodulation or dissociation. This involves a familiar territory that you've seen before. Focus a lot on medial prefrontal cortex and subcortical structures like the amygdala. In the over modulated type, dissociation, there is heightened activity, top-down suppression from medial prefrontal cortex and rostral interior Cingular cortex and decreased activity in the amygdala. There's also decreased activity in the anterior insula where bodily sensations are perceived. These prefrontal areas are regions implicated in regulation of emotional arousal, and it's putting the brakes on so that you're dissociated, and you feel numb. This is compared with the under modulated, re-experiencing type of Ptsd, which has the opposite pattern, with reduced medial prefrontal and rostral interior cingulate inhibition. You also have heightened activity of the amygdala, and you have increased activity in the anterior insula where you are sensing your bodily sensations. Remember this medial prefrontal area is where mentalizing is happening. This is a key area. There is positive correlation between activity in these medial prefrontal areas and vagal tone, which is the opposite of arousal. The positive correlation means that when you're calm and relaxed, this brain region is more active, and the positive correlation also means that when you're highly aroused, and there's low vagal tone, activity in this region is reduced. That goes along with the under modulated hyper arousal type. This is an imaging study that I was proud to be a part of with, with Lanius, of emotional numbing in Ptsd which is associated with hyper arousal. PTSD patients were imagining different emotions related scenarios, and the higher their emotional numbing score, the lower the activity in the medial prefrontal area for both positive and negative emotions. We talk about how dissociation, which is over modulation, can lead to a kind of numbness. We are also saying that there's emotional numbing associated with hyper arousal, because there are two different ways of not engaging the medial prefrontal cortex. There’s this concept of window of tolerance which is in-between the hyper arousal subtype, and the hypo-arousal subtype. Hypoarousal would be the sympathetic nervous system activity in overdrive, and the hyper arousal is parasympathetic activity in overdrive. The hyper arousal subtype is associated with the media prefrontal cortex going offline. The hypo arousal subtype is associated with reduced ability to feel because of inhibition of arousal. You don't have the emotion generated in the first place, and then there's nothing to get to the medial prefrontal cortex. In other words, neuroscience can resolve the parent discrepancies. This concept of Windows tolerance is explained in this paper from 2002. This paper gives examples of how people are on what's called the biphasic rollercoaster, where they're over aroused, doing things like having flashbacks, eating for comfort, flashback rage, self-directed range, nightmares. Or under aroused, failure, shame, alcohol intoxication. What people have trouble doing is getting into this window of tolerance, which is the optimal arousal zone encompassing both intensive emotion and states of a comma relaxation which emotions can be tolerated, and information integrated or mentally represented.

Somatization. Remember, we've talked about how somatization can be thought of as emotional arousal, or emotional distress that doesn't get constructed to a specific feeling of state. It gets stuck in the body. There is interesting experimental evidence in support of the idea that if you have a lot of somatic symptoms, when you are exposed to emotional stimuli, you have more somatic symptoms as you view the emotional pictures. This was a study for roughly 20 to 25 people in each group. There was one group of women with low somatic symptom reporting, and another group who are high somatic symptom reporters in gray. What you see on the Y-axis, is the somatic symptoms that they reported. On the X-axis, different kinds of stimuli emotion evoking pictures. Here is a high, arousal negative with disgust. You see the high symptom reporting folks when they saw a disgusting picture had more somatic symptoms. When they were seeing threatening pictures, they had more somatic symptoms. When they had low arousal, negative pictures they still had more somatic symptoms, positive high arousal, positive low arousal, and even neutral. In other words, there is this connection between very inclined to focus on your body and have somatic symptoms, emotions activate those somatic symptoms.

Is there an emotion-specific mental representation deficit in somatoform conditions? I am going to tell you about some research that we've done in Germany and Arizona. The second study was with Cynthia Stonington, who was here last week. Somatization may arise due to a deficit in detecting and processing internal emotional signals, converting implicit emotion responses into explicit mental representations of emotion. An exteroceptive task that may capture this deficit is one in which the emotional queues are embedded in the stimuli, and are easy to detect and describe, but may go undetected. We use these animations that are targeting the capacity to have theory of mind or mentalization capacity. These are stimuli that were originally created in the 1940s by a social psychologist named Heider. They have recently been upgraded for the neuroimaging context. There are 3 different kinds of animations. The most complex is a theory of mind. The instructions are, watch this and then describe what happened. I had a friend who had just broken up with his girlfriend and he says that's the whole story of our relationship right there. The idea is that there's a lot going on interpersonally. These triangles look like people, and you're making all sorts of attributions about thoughts and feelings that are happening. Here's another type of animation. It's called goal directed where the actions seem to be purposeful. but they're not as complex. There's a third type of random movement and this is important in imaging study, because you want to control for movement, shape, and color. The first study was done in Germany, published in 2010. Many thanks to Claudia Subic Wana, who has been kind enough to take an idea that I had and apply it in a psychosomatic treatment unit in Germany. There were 30 patients who are hospitalized in a 3-month program for persistent somatic complaints that were so severe that it was disabling. They had a control group as well. The first thing to observe was that we gave them the levels of emotional awareness scale, and the patients scored lower on these hypothetical scenarios compared to control. That’s evidence for some limitation in the capacity to mentally represent emotions. The beauty of the animations is, and unlike the levels of emotional awareness scale where we say here's this scenario: how would you feel, and how would the other person feel. With the animations we're not telling them anything about emotions. We're just saying here are the animations tell us what happened. We score what they said, transcribe it and score it for emotional awareness content, using out scoring system. We found patients had lower scores on emotional awareness on the theory of mind animations. Somehow, they're either not encoding or not reporting that there's less mental representation of emotion encoding when they are looking at these animations. There was a trend for the goal directed to be different in the direction, but it was non-significant. We were interested in this and got a grant in Arizona. Cynthia's chair in the department of psychiatry at the mayo clinic in Scottsdale. The mayo clinic is a regional referral center where doctors who can't figure out what's going on, send patients to the clinic for work ups. Many times, a lot of people will have the work up done and they won't find any medical explanation for the symptoms. This is a good place to study somatic symptom disorder. In Arizona we recruited 30 patients with functional somatic syndromes, typically fibromyalgia or irritable bowel syndrome. There are also 29 patients with conversion disorders. That is sensory or motor impairments, like paralysis or seizures that are due to organic brain damage. We had a control group of 30 medical controls from a family medicine clinic and they had a lot of somatic complaints. Their somatic symptoms were rated just as high as with other groups. But for those patients, the doctor said that the objective findings matched the symptoms that they had. Results demonstrated lower emotional awareness with random movement, more with goal directed, and there's even more with the theory of mind. That kind of makes sense because there's more psychological content, in the theory of mind, and there's the least in the random movement. One of the things that we observed that I wasn't predicting was that the 2 somatic symptom groups, conversion disorder, and functional somatic syndrome did not differ from one another. Both groups were significantly less than the controls. We were kind of expecting that with the theory of mind we had that trend previously with the goal directed, and we found that. We also found it with random movement and that was initially puzzling. I mean we didn't include random movement in the German study, because we didn't think it was going to show anything, however it does show something. One way of thinking about that is there's no emotional content, and the patients are seeing no emotional content. They are accurate. There is a significant difference there. An alternative interpretation is that what's healthy is to anticipate emotional content and predict that emotional content will be there. That accounts for the fact that there is some small signal there in the controls, but there could be a deficit in the somatic symptom patients where they are less inclined to predict emotional content and less able to perceive it when it's there.

A related topic in somatization, or how emotions can influence physical symptoms, is this strong association that's been observed between early childhood adversity and having chronic pain. Why is there an association? We published a paper in 2018, putting forward a theory about that. The basic idea is that if you have had early adversity, your emotional awareness is compromised. When you have unpleasant physical sensations, your tendency to think about that bodily state as an emotion is less if you have lower emotional awareness. We're calling this bias competition favoring physical over emotional pain. We think that people who have early adversity and compromised emotional awareness prefer to attend to the physical aspects of the pain instead of the emotional meaning of the pain. A classic paper from George Engel who was the person who created the term Biopsychosocial model. He was at the University of Rochester and was legendary in the field of psychosomatics. He wrote this paper about his clinical observations about psychogenic pain and the pain from in patients. Pain is a psychological experiential phenomenon requiring participation of higher nervous centers. Pain may occur without sensory input. This is accepted by the American Pain Association. He says, “Pain may often seem to serve as a kind of psychic regulator. Here are 3 examples: when a strong, aggressive drive is not fulfilled, pain may be experienced instead. When guilt is present, pain seems to serve as a kind of atonement. Here is another one that fits the case that I presented couple of weeks ago. When a relationship is threatened or lost, pain serves as a replacement. In certain pain prone patients pain seems to substitute for the experience of other more painful emotions. And what we said in this paper is that what we're talking about is an unintentional mechanism parallel to what's observed in patients with borderline personality disorder. They cut themselves from time to time. Why do they do that? It's because they're overwhelmed with a kind of emotional distress that they can't handle and regulate in any other way. They cut themselves, and induce physical pain, and that reduces emotional distress or emotional pain. Our idea is that what happens often in middle age you have an accident or some other injury, and you have physical pain, maybe benign pain. But if you have emotional distress in a social context for example, family conflicts that are difficult to deal with, you may find that by focusing on the physical pain it reduces the emotional distress. In other words, people are biased in favor of focusing on physical pain rather than emotional pain. and that amplifies the physical pain. Neglect and abuse in childhood can limit emotional awareness. Predisposing to the somatic experience of emotional distress, impaired and mental representation of emotion is linked to decreased mentalization ability, decreased capacity to identify stressors, impaired capacity for attachment. The way selective attention works, is that when you focus on one thing, it inhibits the thing you're not attending to. If you focus on physical pain, it will inhibit the emotional distress. and that reduction in emotional distress is rewarding. You keep focusing on physical pain. Unmodulated, subcortically generated, implicit, affect, associated with decreased vagal tone and enhanced inflammation, and inflammation promotes allergenic. That is, benign stimuli become painful. If early adversity involved physical pain, pain of the interpretation of the biggest physical sensations arising from undifferentiated promotional stress. That's our explanation for why there is this association. We thought about how we might address this empirically and came up with an experimental paradigm where we induce unconscious negative emotion, and we present painful stimuli and look to see whether the unconscious negative emotion makes the pain worse compared to unconscious neutral stimuli. There something called the think - no think task where you learn the association between a neutral face and an emotion of open picture, a negative picture. and you could also learn the association between neutral places and neutral pictures. Right then you go through a training phase where you're instructed to don’t let the associated image enter your consciousness. You try to basically inhibit the memory and it works. You can test and show that people who try to remember it versus try to inhibit the memory. The inhibiting the memory really does work. In other words, they've learned the association between a face and say a negative picture. And then they've forgotten the association, they don't consciously recognize it as associated. We show neutral faces of two different types. Those that are associated with neutral pictures that they forgot versus faces that are associated with negative pictures that they forgot, and it's paired with a thermal stimulus. You can rate pain in different ways. One is the intensity and the other the unpleasantness. What we found was that pain, unpleasantness, was greater in the forgotten, unpleasant condition, relative to the forgotten neutral condition. Those were activating unpleasant emotion without people really being aware of it. They rated the heat stimulus as more unpleasant, compared to the forgotten neutral stimulus which we thought was very good. This was done in a study with 70 women, and we said, let's see if it's true in men. In the past couple of weeks, we got the results. In a second study with 70 men, we replicated the finding. Moreover, there was a trend here for a difference in intensity which, when you combine the two, starts to be significant or close to significant.

Splitting. Splitting is universally observed in patients with borderline personality disorder. There's a leading theory in people with border line personality disorder from Peter Fonagy and his group in London that the fundamental problem of borderline personality disorder is the mentalization impairment, corresponding to difficulties in mental representation of thoughts and feelings. I want to introduce the idea of splitting as a developmental deficit. We can call it a defense, but we can also call it developmental deficit. I want you to think about conservation of Volume Task where you have 2 beakers of water, A and B, and you pour the water from B into C. When the water is poured into the tall beaker, a 5-year-old child will say, there's more water in the tall beaker because it's higher. 3 years later, an 8-year-old child will say that the amount of the amount of water doesn't change when you pour the water back and forth from the tall thin one to the short-start one. Why is that? Well, because the 8-year-old child recognizes that that there's 2 different dimensions involved. There's the height, and then there's the diameter and the two generate the same constant value. The key point is that they recognize them as the product of two dimensions, not one right. With splitting, it's one dimension at a time, not 2 dimensions at the same time. As a little thought experiment, would you say that the 5-year-old child is defending against the idea that the volume of water is constant? No, they're not defending, they just can't do it. They can't lift the weight, it's simply not in their repertoire. I think that may be a factor regarding splitting. When we look at the development of the capacity to report a blend of emotions in children, we find interesting things. At age 5, children report feeling one emotion at a time, and denied being able to experience more than one at a time. At age 6-8 they can describe feeling one emotion followed by another: I feel happy at first, then I’d feel sad. Between ages 8 and 12, they can describe the co-occurrence of emotions at age 10 they can bring opposite feelings together for different targets, and in a group study average age 11.3. They were able to bring opposite Valence feelings together for a single object. It's far along in childhood before you can really say that you have a blend of feelings for the same thing. The implication is that mirroring and contingent responding are deficient during development. The development of this capacity may be compromised.

I started thinking about what there might be in the literature on brain basis of splitting. We're talking about one emotion at a time. I remember that years ago a hot topic was hemispheric lateralization for emotion. We don't really think that it works this way, if different kinds of emotions were associated with different hemispheres, then interference in the communication between the hemispheres could account for splitting. Considering current thinking that emotions are the result of activations across multiple networks with default mode, salience, limbic, motor, and perceptual networks. The simplest association between hemisphere and type of emotion is considered outdated. The best evidence supports a superior role for the right hemisphere in perceiving emotion. Some evidence exists for the right hemisphere, mediating negative emotion and avoidance behavior and the left hemisphere mediating positive emotion and approach behavior. If that were true, it'd be straightforward. But meta-analyses of imaging studies do not support this conclusion. But that means aggregating across lots of different subjects. It is possible that different literalization patterns could be present within subjects and that hasn't really been juiced out. If so, interference in communication across hemispheres could be associated with lack of integration. A study reported 2 years ago in which patients with borderline personality disorder show reduced white matter connectivity in the corpus callosum, and fornix, relative to controls. This is a meta-analysis, of 123 patients with borderline personality disorder and 117 controls. We are talking about diffusion tensor imaging which looks at the integrity of white matter tracks, and the corpus callosum is the largest white matter track in the brain – 200 million neurons connecting the two hemispheres. There is impaired white matter connectivity between the hemispheres in borderlines compared to controls in the Corpus Callosum. There was another finding that there was impaired white matter integrity of the fornix which connects the hippocampus to the mammalian body that's involved in memory. The authors say this could be related to splitting. I found another study published in 2020, agenesis of the Corpus Callosum one in 5000 live births are associated with the absence of this corpus collosum. They had 27 patients and compared them to 30 controls. They gave them thematic apperception test cards that have emotion evoking situations and can be scored for defenses. The defenses that they looked at were denial and projection and identification. They did not look at splitting per se. They considered denial to be the most immature. Denial being minimizing tension by wording off internal next to external percepts, that if acknowledged could be potentially upsetting. It is the most basic bridge to the outside world that's being denied. Projection is intermediate and identification, which is the most mature identification minimizes tension by taking on behaviors, qualities, or attitudes of another person, and experiencing that as part of the self. What they found was that the corpus callosom patients had more denial than the controls and less identification than the controls. This suggests that corpus callosom impairment is associated with immature defenses, and it’s playing a role in defense more generally.

The last one I’ll talk about is projective identification. As we said, projection is said to occur when a disowned aspect of oneself is attributed to someone else. I'm not angry, you’re the one who's angry. You're dangerous, therefore I’m afraid of you. The fear is due to projection and projective identification occurs when the other person takes on the projected emotion. In the case above. the other person becomes angry. Projective identification is considered an immature defense that's common in borderline personality disorder. The question is, how does the emotion get into the other person? I would suggest that the emotion is not mentally represented but inactive by the patient with borderline personality disorder. It’s registered in the observer through a mirror neuron mechanism. Mirror neurons were discovered kind of by accident. They were discovered by standard electrodes in these monkeys. and they were looking at motor movement and noticing how motor neurons spike when the monkey would like reach for things. They had the monitoring basically on a speaker so they could hear the bursts. The experimenter reached out to the monkey to give the monkey something and the same kind of crackle with her. Basically, the same neurons were firing when the monkey saw an action the same as were fired when the monkey engage in the action itself. The same pattern spiking when an activity is performed, and when the same action is observed. Now we're going to switch to a clinical application of projective identification to see how this applies. It is not uncommon for medical practitioners to encounter patients who make them feel helpless. The common context for this is patients with somatic complaints for which no medical basis can be found. Such patients often do not accept that the problem is real but functional. The patient demands help yet rejects all the clinicians’ recommendations inducing a feeling of helplessness. As a supervisor of trainees and doctors, this is not an uncommon situation. Case studies suggest that the patient feels helpless but doesn't recognize it. This study suggested earlier in childhood patients’ caregivers did not understand what the child needed, and we're unable to soothe the child. The current medical situation reactivates this earlier experience. If a clinician can understand what's going on and where they're helpless feeling is coming from, this understanding enables the clinician to give the patient what they need, validation, support, and a plan to restore functioning, not for medical tests.

What about in a psychotherapy context? We previously discussed the implicit process of relational knowing as the foundation for higher level constructs, such as conflict, defense, and fantasy. Current psycho dynamic thinking emphasizes the inner subjective emotional field between patient and therapist and a focus on the here and now. We now recognize that counter transference is a critical mechanism for the therapist to understand what keeps recurrent patterns recurring. The therapist can experience what other people in the person's life experience. The therapist can contain and formulate the feelings induced in the interaction instead of reacting as others do, feeling helpless, might get angry. No, you don't do that. Instead, you contain the feeling which permits the therapist to mentally represent and understand what's going on, empathizing and then by empathizing, formulate what the patient is experiencing. That is all going on in the therapist. This information can be used in the service of empathic conjectures. We can inform interventions to produce corrective emotional experiences based on a new understanding of what the patient needs. The patient Isn't mentally representing it. They're enacting what they're feeling. It's picked up in the interaction. It doesn't feel good, but the therapist kind of makes sense of it, puts it together, understands what the person might be feeling and what they need, and respond accordingly, helping them to put it into words their thinking of their corrective experiences.

To conclude, lower emotional awareness is associated with limitations and the mental representation of emotion. Because of the 3-process model, we know that other mechanisms are possible. More extreme impairments and emotional awareness are associated with somatic expression of emotion, corresponding to immature defenses, dissociation, somatization, and projective identification. These immature defenses correspond to disorders, such as ptsd with dissociation, somatic symptom disorder and borderline personality disorder. Splitting may consist of a developmental impairment, and transitioning from level 3, one emotional time, to level 4, blends of the motion. immature defenses and impairments and mental representation of emotion may be different versions of the same phenomenon. A computational perspective can explain how the potential for disturbing our unmanageable emotions can be anticipated and avoided without awareness. Such avoidance or defense may be more likely the more impaired the capacity for mental representation of emotion is. In other words, more deficits more likely to have defenses. It's clinically useful to recognize when impairments and mental representation of emotion exist. For example, with immature defenses, because it requires special interventions to help the patient formulate, mentally represent that which is being avoided. Whereas with mature defenses this is less of an issue. Finally, I would submit that by examining relevant neural mechanisms and processes, different conceptualizations at the psychological level can potentially be reconciled at the neurobiological level consistent with what this course is all about.