Chiron Association for Body Psychotherapists
contemporary approaches to psychotherapy

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4E cognition in therapeutic settings

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Outline

- 4E (embodied, embedded, enactive, extended) cognition
- Interaction theory: An enactive approach to intersubjectivity
- Implications for therapeutic practices

The 4Es

- The 4Es refer to embodied, embedded, enactive and extended approaches to cognition.
- Phenomenology. Pragmatism.
- Basic cognition and human intersubjectivity are deeply and inextricably embodied, environmentally embedded (situated) closely tied to action, and extended (distributed) into the use of tools, technologies, and other aspects of environment.
- Taking these ideas seriously in the context of therapy motivates us to pay more attention to the way therapy can be enhanced by modifying environmental and social affordances.

- General agreement but specific disputes within 4E
- What does ‘embodiment’ or ‘embodied cognition’ mean?
  - Minimal embodiment
  - Semantic embodiment
  - Biological embodiment
  - Functionalist embodiment (extended mind)
  - Radical embodiment (enactivist approach)

1. **Minimal "embodiment"** – activation of B-formatted representations in the brain (Goldman 2012)

- E.g., activation of canonical (motor) neurons in perception
- "Grounded cognition" – B-formats constrain P-formats: activation of sensory-motor areas when we use related object or action words (Pulvermuller 2005)
  - "lick," "pick," and "kick" activate primary motor cortex (M1) that correlate to mouth, hand, foot
- Cognition as simulation – re-activation of sensory-motor areas for higher-order cognition.

Alvin Goldman (2012). A moderate approach to embodied cognitive science. *Review of Philosophy and Psychology.*

2. **Semantic embodiment:** conceptual life begins in spatial and motor behaviors and derives meaning, via metaphoric structures, from bodily experience.

- Metaphors are built on basic and recurring image-schemas such as front-back, in-out, near-far, pushing, pulling, supporting, balance, etc., and the basic image-schemas are built on bodily experience.
- Accordingly, the "peculiar nature of our bodies shapes our very possibilities for conceptualization and categorization" (Lakoff and Johnson 1999; Johnson 2010).

"The concepts of *front* and *back* are body-based. They make sense only for beings with fronts and back. If all beings on this planet were uniform stationary spheres floating in some medium and perceiving equally in all directions, they would have no concepts of *front* and *back*" (Lakoff & Johnson 1999, p. 34).

- Basic image-schemas shape, metaphorically, abstract conceptual thought.
  - Justice = balance
  - Virtue = being upright;
  - planning for the future = framed as up and forward – "What's up?" "What's coming up this week?"

  - *In-out*: Concrete: 'John went out of the room'. Abstract: 'She finally came out of her depression', or 'I don't want to leave out any relevant data'

"An embodied concept is a neural structure that is part of, or makes use of the sensorimotor system of our brains. Much of conceptual inference is, therefore, sensorimotor inference" (1999, p. 20).

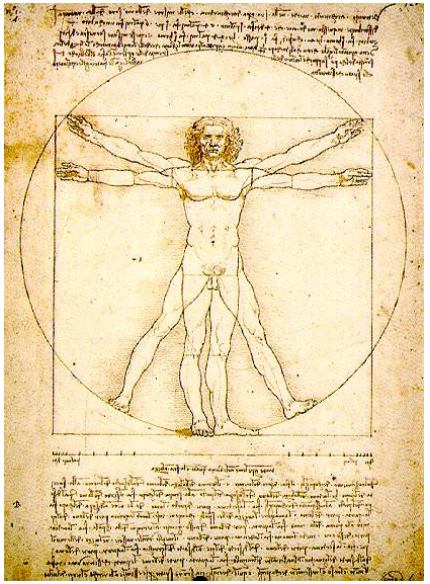
Minimal embodiment  **Enactive embodiment**

The only workable theory of representations is one in which a representation is a flexible pattern of organism-environment interactions, and not some inner mental entity… We reject such classical notions of representation, Representation is a term that we try carefully to avoid. (Johnson & Lakoff 2002

3. **Biological embodiment**: anatomy, chemistry, and movement - extra-neural structural features of the body shape our cognitive experience

– two eyes, positioned as they are, deliver binocular vision and allows us to see the relative depth of things

"The point is not simply [or trivially] that perceptual processes fit bodily structure. Perceptual processes *depend on and include* bodily structures" (Shapiro 2004)



– Motor responses, rather than fully determined at brain-level, are mediated by the design of muscles and tendons, their degrees of flexibility, their geometric relationships to other muscles and joints, and their prior history of activation (Zajac 1993).

- Hormonal changes – changes in body chemistry – as well as visceral and musculoskeletal processes, can bias perception, memory, attention, and decision-making.
- Regulation of body chemistry is not autonomous from cognitive processes, and vice versa. "Body regulation, survival, and mind are intimately interwoven" (Damasio, 1994, p. 123).
  - E.g., Hunger (Danziger 2011)

"The percentage of favorable rulings drops gradually from ≈65% to nearly zero within each decision session [e.g., between break-fast and lunch] and returns abruptly to ≈65% after a [food] break. Our findings suggest that judicial rulings can be swayed by extraneous variables that should have no bearing on legal decisions."

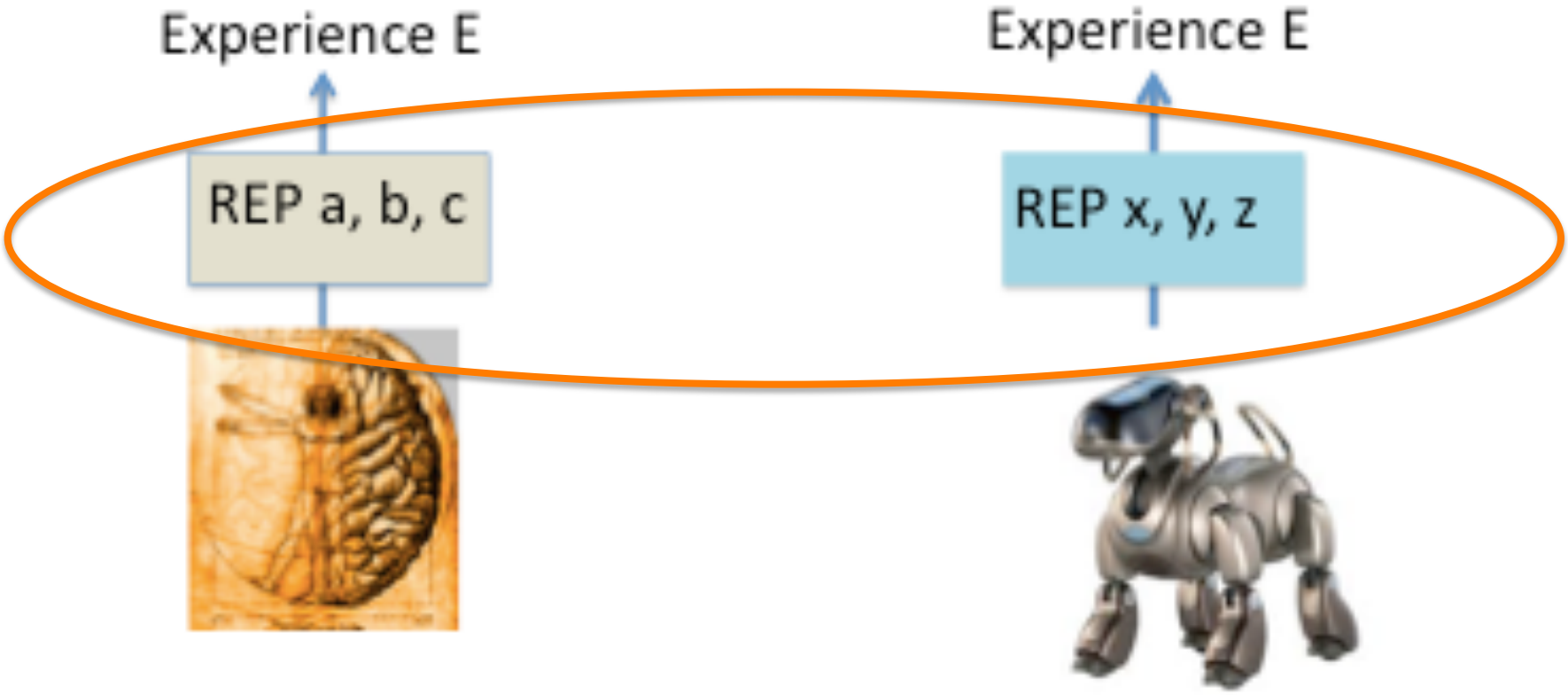
4. The functionalist body

- Refers to the body as conceived in the extended mind hypothesis (Clark and Chalmers 1998; Clark 2008).
- Extended mind: the mechanisms (vehicles) of cognition include pieces of the environment – the tools and technologies that we use to accomplish cognitive tasks (e.g., pencil and paper to do math, notebooks or PDAs for memory) – some of which might be incorporated into the body – prosthetics, cognitive enhancements, etc.

Hands and feet, apparatus and appliances of all kinds are as much a part of it [thinking] as changes in the brain. Since these physical operations (including the cerebral events) and equipments are a part of thinking, thinking is mental, not because of a peculiar stuff which enters into it or of peculiar non-natural activities which constitute it, but because of what physical acts and appliances do: the distinctive purpose for which they are employed and the distinctive results which they accomplish. (Dewey 1916, 8-9).

- Functionalism: it's not the physics (or biology) but the function (syntax, program, representational process) that matters for cognition.
- Body substitutes: a prosthetic hook might substitute for a hand; bodily enhancements might do more than the simple body.
- Clark argues that there are certain parts of the cognitive system that are insensitive to differences in embodied sensorimotor contingencies.
- Cognitive systems allow for buffering, filtering, recoding of perceptual inputs.

- Higher representational processes of the cognitive system will provide “compensatory adjustments” that would even out differences in the experiential aspects that accompany cognition (Clark 2007).



5. Radical embodiment

- Building on the phenomenology of Merleau-Ponty, *enactive* views on embodied cognition emphasize the idea that perception is "for action" – *action oriented* – and that this action-orientation shapes most cognitive processes.
- Perception as pragmatic
- Body-relative affordances (Gibson)

Varela, Thompson and Rosch. 1991. *The Embodied Mind.* Cambridge: MIT Press.

- Like the extended mind idea – the mind is not simply "in the head" or reducible to brain processes; rather, it is distributed across body and environment, to the extent that body and environment dynamically scaffold or take over some of the cognitive load.
- Brain-body-environment
- Unlike the extended mind, enactive theorists claim that bodily processes, as well as environmental factors, shape and contribute to the constitution of consciousness and cognition in an irreducible and irreplaceable way.

- Biological aspects of bodily life, including autonomic, peripheral, affective/emotion systems, have a permeating effect on cognition, as do processes of dynamic sensory-motor coupling between organism and environment.
- Vs functionalist and representationalist conceptions of cognition, enactivist approaches are non-representational and emphasize environmental affordances.
- Noë (2004) developed a detailed account of enactive perception where sensory-motor contingencies and environmental affordances take over the work that had been attributed to neural computations and mental representations.

Interaction theory: An enactive approach to intersubjectivity

- In contrast to standard (observational) accounts that place the full explanation in individualist processes that involve theoretical inference or simulation (ToMM or MNs)
- Interaction theory cites evidence from developmental, behavioral and phenomenological studies about the importance of dynamic embodied interaction and perception.
- Social cognition is constituted in part by these dynamic processes that happen out in the world between people, rather than in individual heads.

De Jaegher, Di Paulo, Gallagher 2010. Does social interaction constitute social cognition? *Trends in Cognitive Sciences* 14 (10): 441-447.

- **Primary intersubjectivity** (Trevarthen 1979) includes sensory-motor processes that allow very young infants to respond to facial expressions, movements, gestures, vocal intonation, etc.
  - When disrupted (as in Tronick's still face experiments; Murray and Travarthen's contingency studies) infants are stressed and upset.

@ 2 months infants "vocalize and gesture in a way that seems [affectively and temporally] 'tuned' to the vocalizations and gestures of the other person" (Gopnik and Meltzoff 1997, 131) – they follow head and gaze (Baron-Cohen 1995; Maurer and Barrera 1981)

@ 5-7 months: intermodal perception of expression of emotions (Walker 1982; Hobson 1993; 2002).

@ 6 months: grasping is perceived as goal directed

@ 10-11 months, parsing of continuous action according to intentional boundaries (Baldwin and Baird 2001)

- **Secondary intersubjectivity** (starting in the first year of life) begins with joint attention and involves understanding others in terms of how they relate to objects in the world and how they behave in pragmatic contexts.
- Evidence from studies outside of the lab in the adult workplace, etc. – movement, gesture, context (Issartel et al. 2007; Kendon 1990; Lindblom 2007; Lindblom and Ziemke 2007).
- Without leaving primary and secondary intersubjectivity behind, more subtle and sophisticated encounters are informed by **communicative and narrative practices** rather than by inferences from folk psychology or simulation

- In embodied interactions, timing and emotional attunements are important.
  - Although minor disturbances in timing and attunement can be quickly repaired in the ongoing interaction, more serious disruptions can lead to a failure of understanding.
- In addition, because such interactive processes are always situated, i.e., they always happen within particular contexts, the participants' understanding of the context or situation enters into their understandings of one another.
- For IT, the focus of attention is no longer exclusively on the individual per se or on what goes on within the individual.

Summary

- Embodied/enactive approaches to cognition go beyond persisting dualistic descriptions of body-mind processes and require radical changes in the way we think of the mind – as well as the brain.
- Furthermore, embodied-enactive-interactive processes relate not just to a sole individual moving around the environment, but to intersubjective and social processes.
- What does all of this suggest about therapeutic practices?

Implications for therapeutic practice

- I've been exploring some of the implications and I've been learning from a number of therapists in different settings.
  - Neuro-physical therapy (Tromsø)
  - Neurophysiology – medical treatment (Jonathan Cole)
  - Cerebral Palsy in children (Helene Elsass Center, Copenhagen)
  - NHS Mental Health Clinic (London)
  - University Psychiatric Clinic (Heidelberg)
  - Autism treatment center, Bambino Gesú Children's Hospital (Rome)

Colaborations

- Øberg, G. K, Norman, B. and Gallagher, S. 2015. Embodied clinical reasoning in neurological physical therapy. *Physical Therapy: Theory and Practice.*
- Gallagher S. and Payne, H. 2014. The role of embodiment and intersubjectivity in clinical reasoning. *Body, Movement and Dance in Psychotherapy*.
- Röhricht, F., Gallagher, S., Geuter, U. & Hutto, D. (2014). Embodied cognition and body psychotherapy: the construction of new therapeutic environments. *Sensoria: A Journal of Mind, Brain & Culture* 56: 11-20
- Gallagher, S. (in press). Embodied cognition in the clinic. In A. Mishara (ed.), *Phenomenological neuropsychiatry*. Berlin: Springer.

Body

- In medical/clinical contexts the concept of body, even in physiotherapy, tends to be the body-as-object – understood in medical-mechanical terms.
- The phenomenological distinction between lived body (*Leib*) – the way one experiences one's body (the body-as-subject, as perceiver from 1st person perspective) – rather than the *Körper* (the body-as-object, 3rd-person perspective) – an important distinction for clinical reasoning.
  - Body image vs body schema
  - Sense of agency vs sense of ownership
- Apply to action but also to interaction in everyday contexts and therapeutic contexts.

Body image:

a system of (sometimes conscious) perceptions, attitudes, and beliefs pertaining to one's own body.

Body schema:

a system of (generally non-conscious) processes that constantly regulate posture and movement-- sensory-motor processes that function without reflective awareness or the necessity of perceptual monitoring.

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- Conceptual distinction: having a perception of (or belief about, or emotional attitude towards) one's own body *vs* having a capacity to move one's own body
- On behavioral level: normally integrated functioning of body schema and body percept
- Clear neuropathological dissociations: neglect vs deafferentation

- **Sense of agency:** The sense that I am the one who is causing or generating an action.
  - For example, the sense that I am the one who is causing something to move, or that I am the one who is generating a certain thought in my stream of consciousness.
- **Sense of ownership:** The sense that I am the one who is undergoing an experience.
  - For example, the sense that my body is moving regardless of whether the movement is voluntary or involuntary.
- Dissociation in involuntary movement and in schizophrenic delusions of control.

E.g., Body schematic problems in autism

- Early studies examining home videos of infants in the first year of life show that children with ASD have serious problems with posture and movements such as crawling, rolling and righting themselves (Teitelbaum et al. 1998).
- Using advanced techniques, Elizabeth Torres et al. (2013) have made detailed measurements revealing a signature pattern of motor problems in ASD early in infancy.
- Body-schematic control of variable movement patterns is based on re-entrant sensory feedback (proprioception), which contributes to the autonomous regulation and coordination of both intentional and spontaneous motor behavior as it forms.

Torres, E. B., Brincker, M., Isenhower, R. W., Yanovich, P., Stigler, K. A., Nurnberger, J. I., ... & José, J. V. (2013). Autism: the micro-movement perspective. *Frontiers in integrative neuroscience*, *7*.

- Torres shows that in ASD – across the entire spectrum – there is a disruption in the maturation of this form of proprioception.
- Thus, in autism typical volitional control is highly compromised, sometimes disrupting motor intentions and intentions in action.
- As Torres et al. note, "These ingredients are all crucial for understanding and executing social dynamics in real time" (2013, 2).
- In working with people with autism this type of body-schematic problem can disrupt therapy.
  - Bambino Gesú Children's Hospital – therapy that addresses motor control and use of gesture.

    Boria, S., Fabbri-Destro, M., Cattaneo, L., Sparaci, L., Sinigaglia, C., Santelli, E., ... & Rizzolatti, G. (2009). Intention understanding in autism. *PLoS One*, *4*(5), e5596.

Interaction in therapeutic settings

- 4E approaches suggest therapists work with individuals in a holistic manner, treating the mind as *what the body does* in its coupling with an environment that has not only pragmatic value but also social-cultural significance.
- Perception, affect and cognition in the therapeutic process are modulated through bodily movements, postures, expressions, gestures, and actions of both the therapist and the patient.
- These may be primarily communicative actions, but the bodily aspects of such actions contribute to a co-creation of meaning, or what De Jaegher and Di Paulo (2007) call 'participatory sense making' – central to therapeutic interactions.

- Therapy is not a one-way targeting of the disabled body or person, but a two-way interaction between two bodies: the therapist's and the patient's.
- In the case of an individual's action, body awareness is different than in non-active self-observation.
  - For example, in action that involves reaching and grasping, the felt differentiation between hand and arm across the wrist is reduced (Vignemont et al. 2009).
  - That is, in action, the hand is not experienced as a body part differentiated from the arm, but is experienced as continuous with the arm: likewise the arm with the shoulder.
- In action, body-schematic processes modulate BI.
- In the case of interaction, something similar.

- In the case of intersubjective interaction, as we engage with the other, there is a mutual activation or resonance between bodies that dynamically inform the interactive process.
- Merleau-Ponty (1962) refers to this as *intercorporeity* – an intersubjective embodied interaction that involves proprioception and kinaesthesia and mutually coupled dynamics.
- Embodied engagement on the part of therapist and patient, and more generally, the relational interaction between them, forms part of the clinical reasoning and assessment processes, whether the therapist and patient are reflectively aware of it or not.

  - **Clinical reasoning**: "on what basis do we reason and reflect and have agency as therapists?" (Michael Soth)

- Thomas Fuchs working with schizophrenics, builds on research on therapist-patient interaction that demonstrates how the facial expression of the therapist mirrors patient's restrained feelings (e.g. Merten et al. 1996, Dreher et al 2001).
- Mimetic-affective interaction in the first therapy hour is a valid predictor for later psycho-therapeutic success or failure (Rasting and Beutel 2005).
- Since embodied interaction is intersubjective, and as such, is not simply something that one or the other individual accomplishes on his own, then clinical reasoning is not just something that the therapist does.

- The therapist's attuning to the cues, signs and symptoms of the patient takes the form of a process of *coordination to* and *coordination with* as described by Fuchs and De Jaeger (2009).
  - *Coordination to* involves individual unidirectional embodied actions; for example in the beginning of a session while the therapist orients herself and talks to the patient or settles the patient into position.
  - *Coordination with*, in contrast, involves interaction and encompasses coordination *with* the patient.

- In working together this kind of mutual coupling is an embodied form of therapeutic engagement involving joint attention and joint action and resulting, when things go well, in a shared agency and a participatory sense-making.
- The connection between improved bodily performance and intersubjectivity – physical and body therapy improve social relations
  - Autism – early intervention
  - Cerebral palsy
  - Schizophrenia

- Neo-Reichian body psychotherapy (BPT) -- combining bodily awareness and focusing techniques, movement therapy, and techniques that target body image disturbances (e.g., boundary loss and de-somatisation) -
- Treatment of patients with chronic schizophrenia -- reduces negative symptoms (psychomotor poverty, i.e., poverty of speech, blunted affect and decreased spontaneous movement (Röhricht and Priebe 2006; Röhricht et al. 2011).
- Individual patients were better able to participate in a range of social activities "for the first time in years," with improvements in expressive behaviors, flexibility of movement pattern and overall emotional expressiveness.

- This therapy aims to have "a positive effect on the transition processes between emotional and motor functioning, supporting or enabling patients' ability to enact (embody) their internal states within social contexts, resulting in an increase in the expression of non-verbal behaviour" (Röhricht et al. 2011, 201).

The environment

"We must observe and understand internal processes and their interactions from the standpoint of their interactions with what is going on outside the skin…."

- That is, we cannot understand processes inside the body in isolation from the environment – an environment that is both physical and social. Rather, in the practice of medicine:

"we need to recover from the impression, now widespread, that the essential problem is solved when chemical, immunological, physiological, and anatomical knowledge is sufficiently obtained. We cannot understand and employ this knowledge until it is placed integrally in the context of what human beings do to one another in the vast variety of their contacts and associations…. A sound human being is a sound human environment"

(John Dewey, 1937, addressing the College of Physicians in St. Louis).

- We should think of the therapeutic setting itself as part of the patient's environment.
- The actual physical and social environment of the therapeutic setting sets up certain expectations in the patient and sets the stage for effective therapeutic practice – it frames interaction and enables the co-creation of meaning –the participatory sense-making – that characterizes successful interactions.
- Physical environment and social context, accordingly, play an important role in making possible "secondary intersubjective" understandings, that is, just those aspects of understanding that are drawn from the particularities of the situation, or in this case, the therapeutic setting.

- Environmental arrangements contribute to the constitution of affordances for both therapist and patient.
- Affordances are physical, social, and cultural.
- Interactions between therapist and patient are not wholly and solely embodied interactions: they are also mediated and negotiated discursively by means of narratives.
- Both the therapist and the patient bring with them certain narratives that act as background for their expectations (Gallagher and Hutto 2008; Hutto 2008a&b, Hutto 2009).
- These narratives reflect both general social norms and specific patterns of expectations concerning therapy.

- All of these factors – the embodied, face-to-face immediacy of primary intersubjectivity, the contextualization involved in secondary intersubjectivity, and the narrative (social-cultural) background, complicate, but also form crucial parts of therapeutic processes.
- All of these factors – and not just a person's mental interior – should be taken into account when attempting to alleviate stress and or change the pattern of self-regulatory responses to a range of challenging/ distressing/problematic/traumatic/adverse events or narratives.

Brain – Body – Environment

Change this –
Psychiatry
Medical model
Medication

Change this –
Body-oriented/
movement therapy

Change this –
Rearranging
life styles and
cultural practices
-- Reinterpreting
narratives

Pluralism in therapeutic interventions?
-- What is the best intervention site for this patient?

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Virtual and mixed reality therapeutic settings

- A possible (still experimental) intervention model that goes beyond established therapeutic attempts to help individuals identify, learn and implement new adaptive strategies in relation to a pattern of regulation problems.
- More flexibility to the therapist for venturing into the everyday life of their patients and their interactions with significant others.
- At the same time, constituting a therapeutic relationship that is truly participative, embodied and enactive and socially inclusive.

How do therapeutic settings relate to a patient's everyday environments?

A lesson from stroke rehabilitation

- Tony Marcel's apraxic patient
- Different environments and tasks lead to different performance levels
  - Abstract (Goldstein) non-contextualized actions
  - Concrete pragmatically contextualized actions
  - Socially contextualized actions and interactions
- Clinical reasoning on this model is an integration of objective knowledge, personal and cultural knowledge, and the actions and interactions of therapist and patient both in the clinical setting and in the social home-work setting of the patient.

- A possible (still experimental) intervention model that could supplement established therapeutic attempts to help individuals identify, learn and implement new adaptive strategies in relation to a pattern of regulation problems.
- More flexibility to the therapist for venturing into the everyday life of their patients and their interactions with significant others.
- At the same time, constituting a therapeutic relationship that is truly participative, embodied and enactive and socially inclusive.

- Mixed reality = virtual reality (VR) integrated with real elements (which could be objects or other people).
- In this approach, the established therapeutic techniques of working with and through embodied, interactive affective processes with imagined other persons (as in Gestalt therapy) are extended on the basis of new technological possibilities.
- This new, technology based intervention model, resembles features of psycho-dramatic scenic enactments of past or present real life scenarios (Röhricht and Priebe 2006)

- In VR and MR simulations spatial environments are created where participants interact with virtual or both physical (real) and virtual objects (Milgram and Kishino 1994).
- The construction of such virtual environments in a therapeutic setting, can introduce novel (more thoroughly embodied/enactive and environmentally situated) aspects to the therapeutic process

- VR and MR have been used in medical and neurological therapeutic applications for a number of years.
- Cole et al. (2009), for example, used VR to provide a virtual arm for amputation patients with phantom limb pain. Use of the virtual arm to pick up virtual objects relieves pain that is otherwise chronic. Use of VR for hospitalized burn patients have also helped to address severe pain (Sharar et al. 2008)
- VR and MR have also been used in (therapy addressing phobias (for exar [fear of heights -- Hodges et al. 199 1995] and arachnophobia [fear of sp 1997]) and embodied disorders such eating disorders (Riva 2005; Riva et al. 1998) and Post-Traumatic Stress Disorder (Difede et al. 2007).

- Carlin et al. (1997) used a mixed reality spider (a furry palm-sized replica of a Guyana bird-eating tarantula) in the treatment of a severe spider phobic.
- The patient used her virtual hand to explore the virtual spider at the same time that her real hand explored the physical replica spider.
- This provided tactile augmentation so that the virtual spider felt furry, and had weight.
- By using a position sensor, movement of the physical replica correlated with a similar movement of the virtual spider (Hoffman et al. 2003).

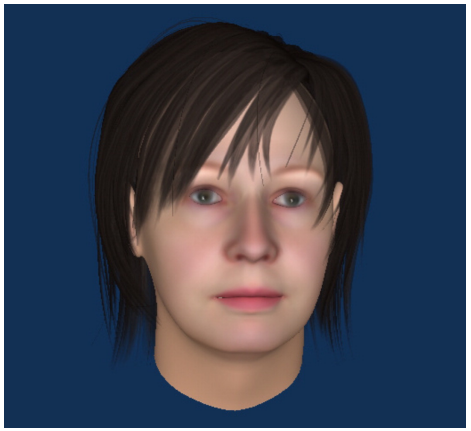
Being able to touch the virtual spider dramatically heightened the intensity of the fear/anxiety experienced by our patient, a manipulation important for successful treatment using systematic desensitization. Desensitization to the virtual spider generalized to real spiders. Our patient made fast long term progress. One year after treatment, she is no longer phobic of real spiders. (Hoffman 1998, 61).

- The construction of MRs that replicate places familiar to the patient also finds application in therapy.
- Skills that are learned or re-learned within MR settings transfer to corresponding real-world situations better than those learned in VR settings.
- Following stroke, for example, the use of a MR kitchen that replicates the patient's real kitchen can facilitate both motor and memory recovery so that the patient can eventually take care of himself in his own home (e.g. Edmans et al. 2006; Pridmore et al. 2007).

- The MR kitchen indicates one principle behind this approach -- usually characterized in terms of brain plasticity, but better conceived in terms of overall system plasticity, where system means the self-adjusting system of brain-body-environment.
- Changes to any one of these integrated factors can lead to pathologies or to cures. Changes to environment or to embodied practices can lead to plastic changes in the brain; and *vice versa*.
- Plasticity depends upon practice, and this suggests that in-therapy practice should be extended to extra-therapy practice – something that is feasible in some cases where the VR setting is portable. In other cases this may call for more intensive in-therapy practice.

- A number of practical and theoretical issues remain open to further investigation.
- Consider the idea of psychotherapy that incorporates MR design to replicate a particular environment (based perhaps on a patient's drawing or photographs), or to expose a patient to an object or set of objects.
- In addition, avatar technology is advancing quickly, so one could also introduce an avatar that resembles a particular person normally encountered in the replicated environment.
- Imagine the therapist and a patient co-constructing a MR environment that replicates the delusional reality of a patient showing positive signs of schizophrenia.

A first systematic attempt of Avatar based therapy for patients with schizophrenia at the University College London, aiming to enable patients to control a hallucinated voice.



The therapist encourages the patient to oppose the voice and gradually teaches them to take control of their voices. …. Even though patients interact with the avatar as though it was a real person, they know that it cannot harm them... As a result the therapy helps patients gain the confidence and courage to confront the avatar, and their persecutor."

- Several patients stopped hearing voices completely after experiencing them for 3-16 years.

Leff, J., Williams, G., Huckvale, M., Arbuthnot, M., & Leff, A. P. (2014). Avatar therapy for persecutory auditory hallucinations: What is it and how does it work?. *Psychosis*, *6*(2), 166-176.

- Now imagine the therapist and patient together walking into a mixed reality environment where the patient can interact with a virtual version of a significant other.
- Could the virtual construction and then deconstruction of that situation have positive therapeutic effects?
- Could we reconstruct a person's reality by constructing a VR/MR simulation of it?
- Could a combination of some kind of movement therapy in a MR environment produce an even stronger effect on negative symptoms than the movement therapy alone?

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