

Generative Dance and Dissociation

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Abstract

In this paper, we examine examples of AI generative dance and generative choreography software to explore whether this class of algorithms might enhance or impede enacting authentic dance. Generative Dance and Generative Choreography is summarized as the use of machine learning models to generate anatomically plausible human movement sequences from a training set of archival movement, with or without musical feature extraction for matching rhythm and mood.

Our foundational assumption is that generative choreography cannot constitute authentic dancing given that generative dance is disembodied. This disqualifies it as a form of dancing vis-à-vis artificial generation. For the purposes

of our paper, we explore the conception of disembodiment as a specific understanding of generative dance as dissociation.

Our conclusion is that the dissociative nature of generative dance has limited ethical and epistemological applications.

We purport that the use of generative dance software is best suited to choreographers who have a strong relationship to their body and body knowledges.

Introduction

With the rise of new generative art programs, there has been an explosion in novel approaches to their exploration and application. Generate dance is one area in which creative movers see an opportunity to benefit from technological developments in AI for the purposes of alleviating personal strain and expanding their ability to synthesize movement vocabularies.

However, we surmise that not all generative art applications are the same, nor can they be applied with similar kinds and degrees of consequences. Though there is some uproar about the use of generative art as intellectually and

creatively dishonest, a distinctive problem for generative dance lurks. All art is inherently affective and embodied, but one might reasonably hold—though with some qualification—that dance is the only art form that is purely kinetic-affective in virtue of its purely ephemeral being. In this way, one can align our understanding of the aesthetic meaning-making powers of dancing with the accounts of Thinking-in-Movement set out by Sondra Fraleigh [1] and Maxine Sheets-Johnstone [2]. Therefore, what marks dancing art as distinctive, and concerning in relation to generative dance, is that it is always embodied because it exists only in the moving-moment.

In this paper, we examine examples of AI generative dance and generative choreography software to explore whether this class of algorithms might enhance or impede enacting authentic dance. Generative Dance and Generative Choreography is summarized as the use of machine learning models to generate anatomically plausible human movement sequences from a training set of archival movement, with or without musical feature extraction for matching rhythm and mood.

Our foundational assumption is that generative choreography cannot constitute authentic dancing given that generative dance is disembodied. This disqualifies it as a form of dancing vis-à-vis generation. For the purposes of our paper, we explore this conception of disembodiment as a specific understanding of generative dance as dissociation.

The embodied component of

choreography comes from the inherent need to draw on one's lived experience and body memories to articulate bodily ideas in the process of creation. That creative choreographing is essentially affective and embodied means that generative choreography is dissociated from the lived experience and organic context that necessarily imbues it.

In this paper, we have three goals. First, we explore how generative dance programs that yield generative choreography can contribute to creative processes of organic choreographing. If choreographers draw on such AI for their creative practices, then that the choreographer's curatorial decisions and modifications can disrupt the ostensible identity relationship between generative dance and dissociation.

Second, we explain how such programs create difficulties for imaginative processes in creative cognition development in early childhood education. We argue that the dissociative nature of generative dance thwarts the development of affective and cognitive skills that art practices intend to foster. This problematizes uncritical use of generative dance in lieu of instructors.

Third, we discuss concerns about the potential of incorporating generative dance into Dance Movement Therapy (DMT) that address trauma-based disorders. We argue that the dissociative nature of generative dance, qua its virtual status, can materially harm patients. Therapists who are not trained in DMT might see generative dance software as a viable therapeutic tool that can be readily incorporated into regular behavioral therapy. Yet if therapists are

not trained in embodiment and embodied knowledge, they will be ignorant of how the mimicry of generic dance sequences by traumatized patients can exacerbate their dissociation.

AI Generated Choreography

There are many different examples of algorithmically generated dance sequences. In 1966, Bell Labs Researcher and early experimentalist in digital art A. Michael Noll considered the possibility of computer-generated dance sequences; and although it was felt to be radical at the time, he accurately predicted the ability to analyze human motion into machine readable data. He further considered the possibilities of the computer as a choreographer's assistant and dancer stand-in to provide a choreographer with a visual aide during the creative process [3].

Much consideration has been given to the way that dance can be captured and archived since, unlike music which has had a widely accepted notation standard for hundreds of years, dance has eluded a standard method of notation across genre. Thus, "[t]he richness of human movements challenge attempts to unambiguously register, store, retrieve, display, and reproduce them" [4]. Many innovations have enabled the capture of dance movement in such a way that it can give a highly detailed description of the gross motor movement of the performer. Much of the literature discusses the ways a performer may be outfitted with motion capture sensors and accelerometers to help define the movement in terms of angle of limbs, rotations, and speed of movement, which

may then be classified into movement regimes that can be strung together [5].

Over the years, different applications emerged as both a tool to be used in the development of a dance work and a tool to be used as an element of the performance, such as reactive set design and costuming. There are now many examples of AI generative dance programs that are intended to mirror or augment a performance with extended features and reactive elements; others provide prompting to a performer. In both cases, a human dancer/choreographer is an integral part of the creative process.

Within the last decade, a variety of generative AI techniques have been used to generate choreography. In general, all of these technologies rely on training data captured for the project or use archival video footage or motion capture data of movement artist performances. It is important to consider not just the type of model being used but also the training data, so we will consider the case of large language models, models trained on extensive open motion capture training libraries, a model trained on a custom motion capture dataset, and a model trained on curated and processed video recordings.

Large language models: Although not specifically geared towards choreography, large language models such as ChatGPT can provide choreographic prompts to a dancer [6]. It would be possible to extend this ability to transfer these language prompts directly into a visually rendered video or image, although no such software currently exists.

Models trained on a large common motion capture dataset: Using a motion capture or video dataset is a way to get training data necessary to develop a generative model. There are some publicly available training sets such as the Kinetics-600 dataset [7], a large-scale action recognition set of approximately 480k videos assembled by Google DeepMind and released in 2017, the Let's Dance data set from Georgia Tech [8], consisting of 1000 videos of various dance genres, and AIST++, developed by Google Research [9].

AIST++ is a 3D dance dataset that contains data of motion captured dance with multi-view videos and human keypoint annotations of 30 different solo dancers across 10 dance genres. Multiple generative dance models have been trained on this dataset, including FACT, an autoregressive model built by the same team that developed AIST++ using a cross-modal transformer.

EDGE [10] is a transformer-based diffusion model that was also trained on the AIST++ dataset. It is often paired with OpenAI Jukebox [11], a music feature extractor. EDGE can generate arbitrarily long movement sequences using the diffusion framework by representing dances as sequences of poses synchronized to musical beats.

Models trained on a custom motion capture dataset: In order to focus on a particular movement style or performer, there are examples of models using specific training sets recorded for the purpose of training a generative model. PirouNet [12] is one such example. It is a semi-supervised conditional recurrent variational autoencoder. It allows users

to label movement sequences using the Laban Effort framework and is intended for the choreographer to curate and supply their own motion dataset.

Models trained on a curated set of video recordings: A highly available source of dance movement data is available in the form of video recordings, and software is available that can estimate the poses of humans within a scene and provide a 3-dimensional representation of those figures to an AI model.

Choreography cGAN [13] is one such model. It is a conditional generative adversarial network trained on 360 Japanese dancing videos. It uses OpenPose [14], a human pose detection library that detects up to 25 human body, hand, facial, and foot keypoints on multiple performers within a scene.

Common Features and Considerations: An important consideration in the discussion of these models is the training dataset used. The datasets were mainly centered around the length of the limbs and the major joint position of the arms, legs, and neck. In most cases, some of the most expressive components, such as sightlines, mouth expression, finger and foot position, were not captured, nor were physiological indicators of breath, such as chest movement, or heart rate that could suggest factors like fatigue or exertion.

In a general sense, all of the models have limited situational awareness, focused mainly on sound/rhythm/musical genre matching, as well as floor contact in the case of EDGE. The models typically conceptualize the movement as either a set of point clouds, or as joint

positions.

What the models considered share in common is the recognition that the models are limited in their responsiveness. The model is not tied to the reality or requirements of the performance space, such as temperature, ambient noise or audience response, gravity, friction, interaction with surfaces, fatigue, etc. that would be imposed on a dancer interacting in a physical world and due to the absence of these essential ties to the physical world, the models are inherently disembodied.

Disembodiment as Dissociation

One of the most enriching experiences of dancing is that this movement practice tethers one to their feeling-moving-knowing body. The creative movement that is dancing—whether improvising or performing choreography—requires the dancer to engender a living connection between their internal body knowledge and the external world. The centrality of body knowledge to movement creation marks its distinctive aesthetic embodiment within the domain of artistic meaning-making [15].

But it is entirely possible, just as a matter of living in a complex and difficult world, that people become alienated from their body's knowledge. When one becomes alienated from their body's knowledge, they lose (or sever) both their potential to link to themselves and their ability to connect to the external world. Within trauma discourse, this form of psycho-affective fragmentation is called dissociation [16,17].

Dissociation is generally an unnatural and unhealthy mode of human disembodiment because it is a willing or forced refusal to engage in phenomenological reflexivity with their own subjectivity. It can metaphorically be described in terms of a ghost. There is a ghost of a self that often looks down and over the body as if the body is not one's own, as if what the body is doing, or what is being done to the body, is not being done to one's self—for one's self is not real, for it is not tied to that body, I am not me, that body is not mine. When one becomes affectively split from their body, they are necessarily separated from the experiences of embodiment, which is our life force for meaning-making [18-21].

The notion of dissociation is uniquely tied to generative dance programs. Because generative dance programs are, obviously and definitionally, disembodied, the outputs of such programs are inherently dissociative. This is a rather uninteresting fact. There is no body so the movement generated is comprised of no affect. If there is no body and no affect and no connection to the external world, then there is no meaning-making potential. It is the absence of meaning-making power that makes generative dance inherently dissociative. But this is not, in itself, a necessary problem.

Where the disembodied dissociative nature of generative dance becomes disconcerting is in its broader applications beyond video games and VR. When people take up generative dance programs and intermingle their moving aesthetic embodied powers with it, the dissociative state of generative dance can then transfer over to the

person. That is, either the dancer's meaning-making efforts become dampened in the interaction, or the meaning-making is erased entirely. In some cases, this makes the use of generative dance in dancing-as-meaning inimical or, even, dangerous.

In what follows, we provide three cases where the application of generative dance into moving meaning-making practices takes on increasing levels of dissociation for both the mover and the movement.

Generative choreography

AI programs can easily yield “dance”, conceived of as a basic intertwining of movement vocabulary. This is, in fact, how some of the programs define dance. But these generative dance programs cannot produce choreography if we are conceiving of choreography as an original generative movement exploration process. The fact that it is reproducing and resequencing stored trained vocabulary evidences a dissociation of the choreographer. The dissociation is caused by the dancer being dissociated from their affect, or interpersonal synergies, that is necessarily involved in the in-the-moment process of decision-making in movement exploration and improvisation. Generative dance is a reflective synthesis of disembodied, dis-embedded sequences. Choreography is a truly organic generative pre-reflective conceptualization of creative movement made from embodied lived experience. If the choreographer is dissociated from her affect when using generative dance programs to contribute to, or complete, choreographic narratives, this

inadvertently and deleteriously produces dissociated sequences rather than affectively laden narratives drawn from a lived body memory.

Most of the programs reviewed were developed as an assistive device to a choreographer. The choreographer must conceptualize and curate the training sets, as well as the resulting generated movement sequences. Generative dance is not intended as a replacement for, and as such the usage of the tool would be up to the choreographer. Choreographers without the resources of a dance company who want to visualize and experiment with dance sequences may find utility in these types of programs. In prompting the choreographer to supply and label their own movement training set using a well-known dance notation system, PirouNet was the most clearly designed in our reviewed models for use by a choreographer for this purpose.

One major limitation of all the software models evaluated was that they all lacked awareness of the space for obstacle avoidance or navigation across uneven surfaces such as stairs. They were also limited to dance sequences of independent movers and were not trained for, nor appeared to be suitable to, work with non-independent duos or groups of dancers when interaction between performers is an integral component of the performance.

Indeed, in various video recordings of choreographer-dancers moving alongside AI avatars, the dancers do not appear to be actively dancing with the AI partner, but rather moving around it. In some instances, it appears as if they are

dodging it or moving away from the avatar. This indicates that they do not see the AI avatar as an actual partner. Such instances of avoidance exemplify an experience of the dancer's dissociation from the dancing because they cannot, or do not want to, properly couple with the avatar to generate partner synergies. Without a human partner, there can be no "dancing with", which means that there is no interrelational meaning-making.

None of the models surveyed suggest that their software is intended or suitable for replacing the work of a human choreographer but rather is intended to either aid a human choreographer or to provide ambient motion in an otherwise non-dance centered work, such as a video game. In discussing the flaws in EDGE, the authors note that there are fundamental issues in matching the rhythm of the accompanying score too closely, and that dance is not inherently about matching the musical beat to the "local minima of joint speed". [10]

Even if used only when the choreographer gets tired or stuck in their movement imaginings, the choreographer may become more and more dependent on generative dance programs, which will dissociate the movement generated from the choreographer's actual distinctive signature style, which emerges directly from affective movement. This dissociation is particularly evident in the transitions between vocabulary, which is where much of the choreographer's signature style manifests. The choreographer cannot merely mimic the generative dance sequences and then add on personal flourish because a

mover's affect appears in the entire movement dynamic of getting into and out of the vocabulary pose.

Further, the presentation of generative dance lacking affect will fail to activate the kinesthetic empathy of the audience. Movement mimesis can certainly be pretty and enjoyable. But organic choreography imbued with affect is more than enjoyable; it is communicative. Therefore, the dissociation of the choreographer from her affective movement creation and style leads to a dissociation between the dancer and the audience because the movement, and its lack of affect, cannot sufficiently generate kinesthetic empathy in the witness. This leads to yet another failure of interrelational meaning-making. In this way, the audience itself experiences a doubled dissociation from movement sequences produced by generative dance programs. It causes a failure of participatory sense-making because kinesthetic empathy is necessary for shared meaning-making. Therefore, generative dance fails as a social aesthetic contribution.

However, there are some beneficial aspects of generative dance programs for the choreographer. First, the use of generative dance programs can serve to prevent injuries because the choreographer may utilize the program to generate vocabulary that excludes the aspects of a movement dynamic that would aggravate the dancer's pain. Secondly, generative dance is useful to save time for the dancer in emergencies, such as when they are given short deadlines, or their movement partners cannot finish the exploratory stages. Third, it can be useful as a sort of

minimal outline archive. The choreographer may train the generative dance program on the dance created, which would lead to a stored set of the movement sequences. Given that there is no standard method of movement notation, the generative dance program could hold onto the dance's outline for later revisiting. And fourth, it is permissible and reasonable for the choreographer to go to AI if they get stuck—but only episodically.

Each of these instances of episodic use of generative dance can greatly benefit a multi-modal approach to diverse curatorial practices. This is because the dancer deploys the generative dance programs in a way that allows them to reinsert the affective embodied human into the disembodied AI movement. When used as a tool, the dissociate tendencies of the AI can be alleviated by the admixture of the choreographer's affect back into the disembodied generative movement. This would be especially effective in the affective transitions that exhibit the choreographer's signature style. One can even imagine a choreographer using AI to represent hostile or oppressive narrative storylines in a conflict-based dance to communicate a lack of humanity or vileness.

Generative dance as “teacher”

Many of the underlying technologies, such as video recording and motion capture have been extensively used as educational or training tools in performance review, archiving, notation, and evaluation. Pose estimation software is relatively new and has not yet

been extensively reviewed in the literature for dance education but could have useful application.

However, the benefits of generative dance in education are highly limited. One can imagine that given its accessibility and familiarity, ChatGPT would be appealing for developing generative dance curriculum in schools. Its accessibility to the public makes it extremely tempting to supplant arts teachers or augment undertrained arts teachers in schools, especially when there are so many calls for cuts to art and dance programs to satisfy budget problems.

The main downfall of relying on generative dance in the classroom is its inability to build higher level cognitive skills. According to ecological psychology and movement for childhood development [22], dance education is necessary not only for the development of critical sensori-motor skills, it is also fundamental to the cultivation of creative cognition. While movement itself contributes to basic cognitive development, the affective component of dance produces skills necessary for higher level critical thinking processes. Specifically, dance, and the imaginative exploration of spatial dynamics, cultivates a kind of social interaction intelligence because it introduces practices of collaboration and thinking-together in space [23].

The incorporation of generative dance programs causes a dissociation between children and their bodies because affect is necessary to build imagination processes inherent to creative cognition. The absence of an arts/dance teacher

removes the play aspect needed to deploy and take in affective interactions. While there may be some cultivation of spatial understanding around their bodies, and between themselves and others, the absence of affect in disembodied generative dance precludes any of the higher cognition skills of collaboration and thinking-together. The dance teacher not only encourages creative play in movement, but also in playing together through movement. Teachers encourage play and unique expression. The teacher not only encourages and demonstrates play and imaginative “as-if” options for creative movement, they also, more importantly, raise the level of play to silliness, which is an elevated affective interaction that builds social trust into creative cognition.

Similar to problems facing choreographers, interaction with disembodied generative dance sequences fails to encourage emotional exploration through movement. When young students are faced with AI instructions, there is no ability to stray from the movement. Thus, students engage in a mimesis of disembodied rules for moving rather than an exploration of affordances for choice of movement and expression that teachers encourage through affective displays of, and participation in, creative possibilities. The rule-like structure of mimesis not only lacks the capacity for play and silliness, it indicates that any deviation from the produced sequences constitutes a failure by the student, which then encourages obedience rather than creativity. Even if the generative dance program is sophisticated enough to provide an AI avatar, the lack of affect

and authentic interaction would add a second layer of dissociation. Now, the students are not only dissociated from bodies and their peers, but they are also dissociated from the avatar.

This is not to say, as in the case of generative dance for organic generative choreography, that there is no use for generative dance in schools. It certainly can be used as an occasional tool. There are days when arts teachers are sick and generative dance programs could be used to fill in the day for the students. Similarly, if the students have a substitute who has no familiarity with creative movement play, generative dance offers a means for the substitute to get through the day. But even having an uninformed math teacher or a completely exhausted gym teacher is preferable given that there are still some affective interactions between students and teacher. However, the acceptance of generative dance as a substitute for an arts/dance teacher could easily lead to the elimination of the teacher; schools often find themselves riding slippery slopes when evaluating budgets.

Incorporating generative dance into the classroom leads to more significant problems of dissociation than when the choreographer uses it as a tool. This is because the students do not yet have an understanding of their body or developed creative cognitive skills. The choreographer is aware of the ways she can be affectively separated from her movement and can take steps to alleviate this problem by mixing her own affect back into the disembodied movement. However, children will not even learn the role of affect in dance and so learn the feeling of dissociation as an

inherent aspect of movement, and more concerning, as a natural response to moving lived experiences.

Generative dance in Movement Therapy

Many of the issues and missing aspects that make generative AI unsuitable for education are amplified in the category of using generative dance software for DMT. DMT is often used to help patients who suffer from trauma connect to their trauma in incremental stages through curated and individualized movement sequences as a means of uncovering, facing, and/or overcoming the source of the trauma [24-26].

Movement, especially dance, allows the patient to access experiences that are buried in the body memory. When people suppress their traumatic experiences and memories in their body, they create a form of dissociation to these memories as a coping mechanism. But this dissociation from trauma can lead to other psychological, affective, and interactive disadvantages in other parts of their life [16,17]. DMT helps the patient connect to these memories through movements that can connect the patient to their trauma through the ability of dance to generate kinesthetic empathy. And in DMT, the movement directed towards the body memory allows the patient to cultivate kinesthetic empathy for herself [27].

Given the ample evidence for the success of DMT in trauma therapy, psychologists and social workers who are not trained in movement therapy might be tempted to incorporate these

programs as one of their healing treatment offerings. Unlike the other cases, where the use of generative dance can be concerning and problematic, such utilizations of generative dance as a source of DMT can cause extreme psychological and material bodily harm to patients.

Therapists who are trained in body knowledge and movement therapy are trained to understand how specific forms of somatic movement can access trauma. And movement therapists assemble targeted movement practices that connect to that person's trauma. They understand how specific movements must be chosen and modified depending on how sensitive the person is to their trauma, how dissociated they are from their trauma, and how much explicit resistance they have to connecting to their trauma. They understand that their own affective relationship with the patient is an additional important desideratum for movement selection. Additionally, the therapist's moderated affect exhibition can serve as a buffer between the patient and the movement towards the trauma memory. Therapists who lack movement training cannot understand how movement generally, and individual movements specifically, can actually trigger a person's trauma in deleterious ways. They do not see how the therapist's affective relationship to the patient, along with personally contextualized movement, is the essential factor in the success of DMT.

If the generative dance program provides movement sequences trained on generic movement therapy examples, it sustains the patient's level of dissociation. This is

because mimesis of disembodied, affectless movement is inherently dissociative. So, at best, it simply leaves the patient spinning her wheels while forking out an exorbitant amount of money. But mimesis of disembodied movement that produces generic sequences that match the moving shape of the patient's trauma can fully ignite the patient's trauma.

If the patient has cultivated a dissociative relationship to their trauma to cope, then one of the consequences that can result from such a high degree of triggering is a significantly stronger, more sedimented, and more pervasive state of dissociation to many of the patient's body memories that surrounds or shares content with the trauma. This expanded state of dissociation will cause, as generalized dissociation causes, extreme somatophobia, which is a deep loathing and fear of the body itself. Because trauma is embodied, and because trauma attaches itself to the body, dissociation deteriorates the patient's relationship to their body; and in some cases, the patient can become fully dissociated from their body.

Expanded states of dissociation can further lead a patient to amp up their experience of internalized psychological oppression. Experiences of trauma, especially sexual assault, causes the patient to see themselves, and their body, as the source of their "neurosis" and felt blameworthiness for their trauma. Often, when patients regard themselves as to blame for their trauma, especially if they cultivate a dissociated relationship to their body, they often engage in self-harming behaviors as an embodied coping mechanism.

Conclusion

Ultimately, the disembodied nature of generative dance has limited ethical and epistemological applications because it causes varying degrees and kinds of dissociation within movers. When used as a tool, it can be highly beneficial; however, it can be problematic if the choreographer becomes too generous with its use, and especially if they become reliant upon it. When used as a substitute for an embodied teacher with an affective disposition towards the movement of students, this can impede the development of higher level creative, critical thinking skills. This dissociation produces a docile body and creates difficulties in social interactions of collaborations through spatial dynamics of thinking-together practices. Finally, we have shown how generative dance in DMT can cause deep material harm to patients and should be avoided. We conclude that the use of generative dance software is best suited as an occasional tool for choreographers who already have a strong relationship to their body and body knowledges.

References

1. Fraleigh, Sondra Horton. *Dance and the Lived Body: A Descriptive Aesthetics*. Pittsburg: University of Pittsburg Press, 1987. --- *Dancing Identity: Metaphysics in Motion*. Pittsburg: University of Pittsburg Press, 2004.
2. Fraleigh, Sondra Horton. *Dance and the Lived Body: A Descriptive Aesthetics*. Pittsburg: University of Pittsburg Press, 1987. --- *Dancing Identity: Metaphysics in Motion*.

- Pittsburg: University of Pittsburg Press, 2004.
3. Noll, A. Michael, "Choreography and Computers", *Dance Magazine*, January 1967.
 4. Sagasti, Francisco *Information Technology and the Arts: The Evolution of Computer Choreography during the Last Half Century*, *Dance Chronicle*, 42:1, 1-52. (2019)
 5. Kaspersen, Esbern & Górný, Dawid & Erkut, Cumhuri & Palamas, George. *Generative Choreographies: The Performance Dramaturgy of the Machine*. 319-326. 10.5220/0008990403190326. 2020.
 6. OpenAI. "Choreography" *ChatGPT*, OpenAI, 2023.
 7. Joao Carreira, Eric Noland, Andras Banki-Horvath, Chloe Hillier, and Andrew Zisserman. A short note about *Kinetics-600*. arXiv:1808.01340, 2018.
 8. Castro, Daniel, James Hays, Irfan Essa. "Let's Dance: Learning From Online Dance Videos." *eprint arXiv:2139179*. 2018.
 9. Sheets-Johnstone, Maxine. "Thinking in Movement". *The Journal of Aesthetics and Art Criticism* 39, no. 4 (1981): 399-407. --- "Phenomenology as a Way of Illuminating Dance". In *Illuminating Dance: Philosophical Explorations*. Sheets-Johnstone, Maxine (ed.) London: Associated University Presses, 1984: 124-145. --- *The Primacy of Movement*. Philadelphia: John Benjamins Publishing Co., 1999. --- *The Phenomenology of Dance*. Philadelphia: Temple University Press, 2015.
 10. Jonathan Tseng, , Rodrigo Castellon, C. Karen Liu. "EDGE: Editable Dance Generation From Music." 2022.
 11. Prafulla Dhariwal, Heewoo Jun, Christine Payne, Jong Wook Kim, Alec Radford, and Ilya Sutskever. *Jukebox: A generative model for music*. arXiv preprint arXiv:2005.00341, 2020.
 12. Papillon, Mathilde, et al. *PirouNet: Creating Dance through Artist-Centric Deep Learning*, arXiv, doi:10.48550/ARXIV.2207.12126. 2022.
 13. Huang, YF., Liu, WD. *Choreography cGAN: generating dances with music beats using conditional generative adversarial networks*. *Neural Comput & Applic* 33, 9817–9833. 2021.
 14. Cao, Z., et al. 'OpenPose: Realtime Multi-Person 2D Pose Estimation Using Part Affinity Fields'. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2019.
 15. Colombetti, Giovanna. *The Feeling Body: Affective Science Meets the Enactive Mind*. Cambridge: MIT Press, 2014.
 16. Krause-Utz, Annegret. "Dissociation, Trauma, and Borderline Personality Disorder". *Borderline Personality Disorder and Emotion Dysregulation* 9, no. 14 (2022): 1-6.
 17. Ross, Colin. "A Dissociative Model of Borderline Personality Disorder". In *Borderline Personality Disorder: Research*. Jackson, Marian and Linda Westbrook (eds.). New York: Nova Science Publishers, Inc., 2009: 117-125.
 18. Gallagher, Shaun. *How the Body Shapes the Mind*. Oxford: Clarendon Press, 2006.

19. Maiese, Michelle. *Embodiment, Emotion, and Cognition*. New York: Palgrave Macmillan, 2010.
20. Maiese, Michelle. *Embodied Selves and Divided Minds*. Oxford: Oxford University Press, 2016.
21. Summa, Michela. "Body Memory and the Genesis of Meaning". In *Body Memory, Metaphor, and Movement*. Koch, Sabine, Thomas Fuchs, Michela Summa, and Cornelia Müller (eds.). Philadelphia: John Benjamins Pub. Co., 2013: 23-41.
22. Stern, Daniel. *The Interpersonal World of the Infant (View from Psychoanalysis and Developmental Psychology)*. New York: Basic Books, 2000.
23. Giguere, Miriam and Matthew Henley. "Embodied Cognition, Civic Interaction, and Spatial Dynamics". Conference Presentation. *Embodied Cognition and Dance Workshop*, North Andover, MA, April 19-22, 2023.
24. Chodorow, Joan. *Dance Therapy and Depth Psychology: The Moving Imagination*. New York: Routledge Press, 1991.
25. — "Dance Therapy: Motion and Emotion". In *The Art and Science of Dance/Movement Therapy: Life is Dance*. Chaiklin, Sharon and Hilda Wengrower (eds.). York: Routledge Press, 2016: 53-74.
26. Wengrower, Hilda. "The Creative-Artistic Process in Dance Movement Therapy". In *The Art and Science of Dance/Movement Therapy: Life is Dance*. Chaiklin, Sharon and Hilda Wengrower (eds.). New York: Routledge Press, 2016: 13-32.
27. Fischman, Diana. "Therapeutic Relationships and Kinesthetic Empathy". In *The Art and Science of Dance/Movement Therapy: Life is Dance*. Chaiklin, Sharon and Hilda Wengrower (eds.). New York: Routledge Press, 2016: 33-52.