Affording Difference : Different Bodies / Different Cultures / Different Expressions / Different Abilities

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Abstract

Affording Difference, is a project within the MetaBody framework(1) to study:

- Tools for understanding and raising an awareness of cultural diversity
- Tools for fostering embodied communication for a sustainable culture

"The project proposes the development and implementation of tools of interactive technology for different(ly-abled) bodies, challenging the notion of ability/disability and considering all bodies as different(ly-abled), while specifically paying attention to bodies that are usually considered disabled and affording them new tools of expression in which their difference acquires a positive value."(2)

Despite the shortening of MetaBody's time frame, motion tracking, touch sensors and shaking tools have been developed and applied *in vivo* testing with persons of diverse backgrounds and abilities, including many with severe disabilities. This article summarizes the results of those tests.

"Using motion tracking technology (including video-based and controller-based systems), dance and music, the questions the research poses include: How can we remove barriers to expression? Technology tends to reduce gestural expression, how can we expand it -- expand range of movement, range of expression? How can we promote a more positive awareness of difference, through disalignment(3) from normative conception of ability or intelligible expression? How do we generate affordances that invites deviant (alternative) behaviors which foster plurality and not homogenization? What are the cultural differences in the perception of difference? How do these differences relate to acceptance and integration (inclusion)? How do different societies (including governmental and non-governmental organizations) approach inclusion?"(4)

Anecdotal evidence was gathered through extensive video documentation, photos and journals by workshop leaders. Research and observations were focused both on the individual user experience as well as on collective social experiences. Similarities rather than differences were highlighted and used to build inclusive scenarios which led to useful therapeutic and pedagogical outcomes. Observations on abilities as creative expression also fed back on the development of the interactive technologies.

Introduction

Music and dance are correctly seen not only as art forms, but as deeply-engrained human behavioral artifacts, common to every human culture and historical period. Although, they can be learned and mastered according countless traditions, they are also instincts -- children will do them without any role model or instruction whatsoever. That these activities play a role in human health as motivators for healthy movement(5), creative expression and social interaction is well-established (6,7).

Many of the barriers faced by persons with disabilities fall away in the practice of dance and music; intellectual savvy, or even the ability to speak, might be irrelevant. Even without interactive technology, dance and music can be tools for inclusion. Digital technology, such as sensors and motion tracking, together with gesture and choreographic analysis, algorithmic musical composition, and so on, extend these possibilities. They add what we call open affordances. These are the features of digital devices or environments that afford a more open form of exploration, where searching, discovering and playing are basic afforded actions.(8)

These actions are still dependent on the users' capabilities, of course, but much less in the form of skills; rather it relies on sensory and attentive focusing, and might be amplified by mental traits or states like openness and creativity. It can, in fact, be linked to instrumental affordances, in the sense that exploration and mapping out action possibilities and feedback patterns can be a necessary prerequisite for starting to develop skills.

Whether the user is stimulated by the sense of playing a musical instrument, by the experience of dancing, or by some mixture of the two was not parsed in our studies. Rather, we were much more

generally concerned with *the fact* of their stimulation for this joyful process breeds engagement and the broader acceptance of diversity and inclusion.

Moreover, in the context of disalignment(9), acting out one's uniqueness, however intentional or unintentional, suddenly becomes a plus -- interesting, praiseworthy and even artistic. We used this potential to create and build up a collective experience of the interactive environment.

And finally, the open affordances of such a technology impact back onto the design process. For example, although we design an interactive environment to be used in one way, users will often do it "incorrectly", and thereby uncover particularly expressive variations that no one in our team had thought of (there is an example of this below, in "Outcomes: Anecdote 11"). This informs future designs -- both in terms of re-thinking the mapping, but also in the ways we lead workshops.

Procedure

From July 2013 to November 2015, a team of workshop-leaders, engineers, composers, choreographers and assistants sought evidence that interactive digital movement-to-music technologies can play a role in affording dance and music engagement among highly diverse individuals and, in so-doing, provide new methods of promoting inclusion and the acceptance of diversity. The work took place in the form of 28 workshops in 6 European countries. A total of 242 persons with disabilities took part, as well as 119 therapists, teachers and care-takers.(10)

The types and severity of disability varied widely, as did age and demographics. Disabilities included Rett Syndrome, Autism (Autism Spectral Disorder), Cerebral Palsy, Quadriplegia, Parkinson's, Alzheimer's and others. Most workshops also included "non-disabled" participants (including professional dancers). Ages of participants ranged from 8 to 85.

The work was organized through institutions for persons with disabilities and participation was free. Sessions alternated individual and collective exercises. They began with the entire group doing a warm-up/body-work which generally lasted 30 minutes. This was followed by a demonstration of the interactive system, and the opportunity for participants to get an individual taste of the experience. Next, we divided into smaller groups of 3-6 persons where each participant had much more time to experiment. In this section the individual needs of participants guided the workshop, as much as storytelling scenarios and little performances. At the end we would bring everyone together for a finalé, which was followed by a de-briefing -- sometimes with the participants, and sometimes without (i.e. only with workshop leaders, therapists, family members and care-takers being present).

During sessions, afterwards in discussions (with workshop leaders, therapists, family members and participants themselves) and through video analysis, we questioned the idea of diversity through dis-alignment and the meaning of "disabilities" -- what we would prefer to call "other abilities" -- as they serve creative expression. Finally, we looked at such expression from therapeutic and pedagogical perspectives.

Technology

All workshops used at least some video-based motion tracking, either based on Eyesweb(11) or Eyecon(12), with interactive music environments designed by a number of composer/engineers(13). In some of the workshops touch sensors were also used (i.e. an electrical system that allows the touch between two persons to control media(14)).

Outcomes

The following is a collection of 11 anecdotes, illustrating various principles which we discerned from observation. Each is accompanied by a archived video excerpt (15).

Anecdote 1 - Daniel(16)

Site 27, video 100456, 12:01-14:32.

Daniel has a mental disability. His movements tend to be quite stiff and limited. We used a pitch-bend effect and he discovered his body in a new way. He stretched his fingers, rotated his arms, used foot movements and even small jumps. Perhaps most striking, however, were the pauses he employed, freezing in place to delineate the effect that he was having on the music. He would smile broadly in satisfaction of realizing the effect he was having on the music.

This demonstrates key principles in interactive dance-music experiences:

1. Stillness-to-action. This is the most basic and perhaps most powerful of movement-music mappings, namely that movement causes sound and stillness causes silence. Notice: stillness is not a passive experience -- people do not normally freeze! It is a special task. When frozen, one tends to listen. Thus, by repeatedly stopping and starting, one very quickly gains a clear sense that the body is linked causally to the sound.

2. Small vs. large body-movements. Daniel not only used small finger movements to control sound, but also large body movements. This alternation is based on two basic metaphors: small controlled movements (musician), and large body movements (dancer). While the former develops a fine sense of control and causality, the latter leads to increased physicality (breathing faster), with its inherent excitement and stimulation.

3. Height-to-pitch. For reasons that are not entirely clear, stretching up tall implies higher pitched sounds, and bending low implies low ones. (Obviously, even the words embody this parallel). In any case, the mapping is highly intuitive.

4. Body-part extrapolation. As he explored the sound environment, Daniel began more and more to use different body parts. After hearing what his fingers were doing, he tried the head, torso and feet, even jumping on one occasion. This extrapolation from one body part to another is intuitive, though not altogether logical, since not all of these body parts were actually being tracked. This freedom from defined goals, and individualization of the experience is an example of disalignment. His movements grew, not only in size and body-part, but in originality. We saw a progression from defined, mapped experiences, to freer, non sequitur (artistic) elements.

Anecdote 2 - Fernando

Site A, video 100106, 5:00-12:13.

Typical of children with severe autism, Fernando does not look at you in the eyes. He normally does not like to touch other people. We attached wires to him and to the musicologist, Alicia Penalba, to make their touches audible: each touch triggered a small attractive sound. After Dr. Penalba touched him several times, Fernando began to reach out to her in a similar way. This led to physical contact between them.

Anecdote 3 - Basir

Site 13. Photos: DL_P1060766, DL_PP1060764, DL_P1060761.

A common method used was for the teacher to join the child in the interactive environment and to practice a kind of copying game. Every movement is converted to musical sounds -- both for the teacher and for Basir. First the teacher moves, then Basir joins her and it becomes a duet. After doing this for a while, Basir began to create his own physical (dance) expressions that had nothing to do with what the teacher had done.

Anecdote 4 - Gabriel

Site 8. Video 100234. 3:34-14:30.

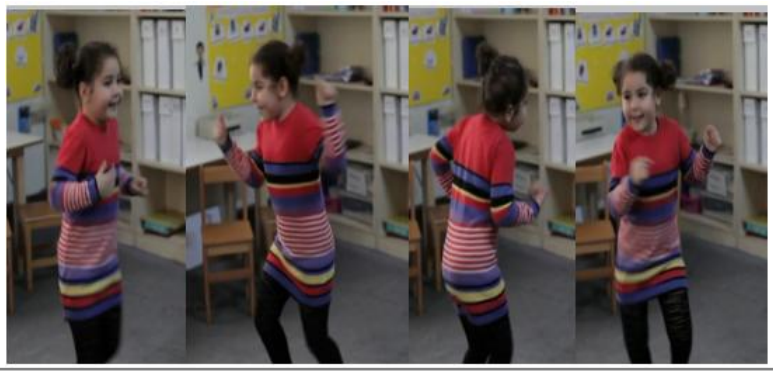
Although the camera-based systems we used allow any movement to make music, to learn to control the music in more than a stop-and-go fashion means learning which movements generate which sounds. For example, the height of the arms might determine the pitch of the notes. For persons who cannot understand this, we sometimes begin by holding hands, and essentially moving their hands for them. Finally, they may begin to explore on their own. Although it took many repetitions, Gabriel in the end was able to play music without assistance.

Anecdote 5 - Anna

Site 14. Photo courtesy of International Rett Syndrome Foundation (www.rettsyndrome.org).

Persons with Rett syndrome (which affects only girls), tend to hold their hands tightly together. We worked at a center for Rett Syndrome in Rome. As described in Anecdote 4, we stretched Anna's hand into space away from her wheelchair to play notes on a vibraphone. After some minutes she began to do the same movement by herself and smiled. Her mother and her therapist said that this exploration behavior was unusual and very positive.

Anecdote 6 - Asli



Site 13. Video 100342, 35:23-35:52

Asli is a precocious 6 year-old autistic girl. When we turned on the interactive environment she jumped up and down, waved her arms while turning in circles -- clearly she loved to dance! But most interesting to us was the clever way she "turned around" our methodology. She asked others to play the part of the computer system, and to make the appropriate sounds when she moved. In this way she projected the idea of the body as a musical instrument.

Anecdote 7 - Aneta

Site B. Video 100145, 45:12-45:31.

When Aneta was moving she was triggering vocal sounds. In this scene, her movements were triggering a "meh" sound, and so she began to use mouth movements to trigger the sounds. Similarly, bird sounds cause people to move their arms (as wings), and so on. Such physicalizations (or embodiment) of sounds, play a powerful role in our movement expression.

Anecdote 8 - Kristina

Site 5. Photo JD_2908, JD_2907.

The triggering of vocal sounds through movement can lead to increased vocalizations in persons who have difficulty speaking. We observed this on a number of occasions. Kristina normally does not speak at all but during a session in which her movements were triggering sounds, she started vocalizing. Interestingly, her mother told us that she continued on into the evening after our session.

Anecdote 9 - Thomas and Annika

Site 2. Photo: AP_23343, AP_23323

Tomas is blind and in a wheelchair since early childhood. We created a performance piece with him and a professional dancer, titled, "Tiresias" and have performed it twice. A bond often develops between performers, but it is especially strong when working with persons of widely different abilities. The dancer, Annika Dörr, said of the experience:

"Thomas is one of the greatest and most impressive personalities I ever met. To work with him was a huge luck and something I keep telling people about. Not many dancers get the chance of creating a duet with someone like Thomas. He is very smart and extremely direct which made our work together super enjoyable and rich. Thomas has the ability that I believe many blind people have - he can sense things in a way we cannot even imagine.... These weeks and experiences I will be forever thankful for." (17)

And the composer, Andreas Bergsland, added:

"It is evident that he listens attentively when he is playing. Especially in the Particles environment he could spend a lot of time searching for the particular sounds that he liked by moving his arms up and down... -- sometimes with one or two fingers only, and sometimes with the whole hand... His sensitivity and control over the sounds often gave beautiful results..."(18)

Anecdote 10 - Frederick

Site 7. Video 100141, 4:51-6:23.

Fredrick is a male adult with severe mental and physical disabilities stemming from Cerebral Palsy. He made a particularly strong impression on the workshop team through a session with the a tonal music environment. Although the interactive mode is especially made for playing with the arms, Fredrick played it with his whole body, half sitting and half lying. Although his interaction was characterized by overall high tension and full body activity with a great deal of back and forth swaying, he seemed to have good control over his general activity level. This allowed him to generate several crescendos building up to sections of high intensity, and several when his body was almost still, thus making beautifully dynamic music.

Anecdote 11 - Damian

Site 26. Video 100525, 12:12-12:52.

The interactive environments we used included those we call "chair mode". These allow the control of the music to take place through a combination of activity and arm-height, where the arms are raised beside the body as two control parameters (left-arm height, and right-arm height). Arm-height will only work properly when the arms are beside the body, yet Damian did not this (despite having been given those instructions). Instead he reached forwards, bringing about a completely different and new expression. He was still controlling the music, but in a different way than was intended by the system designers.
Other people similarly "miss-used" chair mode by stretching both arms to the same side, crossing the arms before the body, twisting backwards in the chair, reaching downwards to the floor, and so on.

Conclusions

We have noticed in increasing detail and sophistication, the aspects of human movement which, when sonified, are most meaningful to movers in their movement-music expression. While there is important diversity in range of expression, ability and body type, we found the disalignment context important in designing systems that accommodate aberrant behavior. Specifically, this means:

1. systems with the broadest possible range of mappings
2. systems that are equivocal, employing for example fuzzy logic, rather than strictly 1-to-1 mappings
3. systems that can be controlled only using activity-based parameters (as opposed to position-oriented parameters). Many people cannot (or do not want to) use fixed-measurement controllers.
4. systems for which there is no "wrong" way to play them

On a deeper level, a profound re-thinking of system design may be needed. As one of the designers, Andreas Bergsland put it: "The concept of affordance can be useful when designing interactive environments, because it invites thinking about users, technology and audience as an ecosystem where reciprocal interchange of information and sensation take place. It highlights the fact that both thinking and sensing are distributed and embodied processes, where environment, technology and users constantly feed back on each other."(19) This dynamic looping process enriches the experience and contributes to the creation of scenarios helpful in integrating the experience on a collective level.

Performing, that is, the showing of what one can do, also plays a role in the process of raising awareness of diversity. Indeed, the interactive motion tracking with its "play area" offers a unique stage for this process to unfold. The workshop leader assumes the role of director/conductor, orchestrating the set through storytelling, theater and dance.

Rather than leading to exclusion, awareness of our differences in a creative setting can have the opposite effect. Listening and observing the other, imitating the workshop leader and following the same rules together allows a freedom of expression in a co-footing environment. Everyone is differently the same. The disability doesn't exist anymore or is perceived as a poetic difference. "Listen to my body talking" promotes diversity through original movement and sound.

Future Work

With MetaBody partners InfoMus and Steim, we are looking into extending the range of human movement properties which we believe could improve the technology and make a richer user-experience. For example, higher order movement qualities, such as softness, lightness, tension and so on are important to how we feel when we move and yet are largely out-of-reach to the technologies used in this study. Shape-based aspects -- twists of the torso, twist of limbs, bending of torso and limbs, extension and contraction -- represent a similarly out-of-reach area.(20) The dancer Muriel Romero pointed this out at the 2015 MetaBody Conference in Madrid when she said, "As soon as I do something interesting with my body, the technology gets confused".

Finally, the way we look at interactive technologies could lead to a new perspective of the body and by extension, society. Soft skills, as artistic and creative expressions, promote the vision of a sustainable and inclusive culture. Beyond therapeutic and pedagogical interests, we observed that the joy and pleasure felt by participants has a universal echo concerning the perception of the body. What is imperfect, what we call dis-able falls away in this universal perspective.

Notes

1.
MetaBody's contract with the EU, page 11, GENERAL OUTCOMES, "The MetaBody network will explore future implementations of the project in ... Environments for people with special needs and disabilities". Page 42, "The function of the Entity Palindrome Dance Company, e.V. as co-organizer of the Project, ... is the following: .... - Distributed (multiple-location) workshops with developers, creative artists and persons with disabilities assigned to specific themes and challenges. -Use programs in area schools and facilities for adults and children with disabilities."

2.
Internal MetaBody accord from Istanbul, 11.11.2014. Authors include Ekmel Ertan, Marcello Lussana, Josepha Dietz, Jaime Del Val, Delphine Lavau, Robert Wechsler. This draft dated was date 27.1.2015.

3.
As far as we know, disalignment is a term coined by Jaime Del Val. In his words, "You are surely aware of the western privileges that pervade your own discourse... I believe though in the possibility to exceed those biases in a multiplicity of disalignments... if we are to reinvent our embodiments, perceptions, kinetic relations with the world. Not a utopian task we can undertake all at once and as a whole. Subtle disalignments is my proposal." Email to MetaBody Co-organizers, 14.4.14. Reprinted with permission.

4.
ibid 2

5.
The health benefits of movement can be measured by looking at the risks inherent in its deficiency. According to the World Health Organization, "Physical inactivity (lack of physical activity) has been identified as the *fourth leading risk factor for global mortality* [our emphasis](6% of deaths globally). Moreover, physical inactivity is estimated to be the main cause for approximately 21–25% of breast and colon cancers, 27% of diabetes and approximately 30% of ischaemic heart disease burden." http://www.who.int/dietphysicalactivity/pa/en/ (accessed 12.12.2015).

6.
Gregory D. Four decades of music therapy behavioral research designs: a content analysis of Journal of Music Therapy articles. J Music Ther 2002;39(1):56–71.

7.
Am J Public Health. 2010 February; 100(2): 254–263. The Connection Between Art, Healing, and Public Health: A Review of Current Literature http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2804629/

8.
The affordance issue per se, was discussed by Bergsland in the paper he delivered at the IMF Weimar: Bergsland, A.; "Aspects of digital affordances: Openness, skill and exploration", International MetaBody Forum, Weimar, March 2015.

9.
ibid 3

10.
The complete list is available at http://www.palindrome.de/ad_sites.pdf. (Uploaded 14.12.2015). The numbers in this table are slightly higher due to overlaps.

11.
EyesWeb was developed by InfoMus (http://www.informus.org).

12.
Eyecon was developed by Frieder Weiss (http://www.frieder-weiss.de).

13.
The composers involved were Dr. Andreas Bergsland, Adrien Garcia Dr. Andrea Cera, Pablo Palacio, Ives Schachtschabel, Dr. Dan Hosken, Marcello Lussana and Giacomo Lepri. Robert Wechsler also contributed sound designs. Much of the music used was designed as part of a project to develop a device for persons with and without disabilities called MotionComposer (http://www.motioncompser.org).

14.
There is a separate paper from some of the same authors on this subject: Marije Baalman, Delphine Lavau, Pablo Palacio, Robert Wechsler; "Touch Matters", MetaBody Journal -metacultural critique-2.

15.
Video archive is maintained by Palindrome, e.V. at Karl-Haussknechtstr. 11, 99423 Weimar and is available upon request (info@palindrome.de).

16.
Names of persons of other abilities have been changed. Photos are used with permission where ever possible.

17.
Email from Annika Dörr to Robert Wechsler dated 10.12.2015. Reprinted with permission.

18.
Email from Andreas Bergsland to Robert Wechsler dated 10.12.2015. Reprinted with permission.

19.
ibid.8

20.
The institute InfoMus in Genova, Italy, directed by Dr. Antonio Camurri is conducting relevant development research. It is only a matter of time before many of these qualities will be available for use in interactive systems such as those we used.

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