A performance as shared space of action

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Abstract

Since the discovery of the 'mirror neurons', a lot of research related to the activity of these special brain cells has been carried out. Outside academia people like the Dutch choreographer Arno Schuitemaker became fascinated as well. For him, these mirror neurons are a source of inspiration, since this knowledge provides insight into the relation between action and observation (Iacoboni, 2008; Rizzolatti & Sinigaglia, 2008), and therefore into the relation between performers and spectators. Schuitemaker used this knowledge while working at The Fifteen Project (2011). The core of the performance is a shared experience of dancers and spectators.

In this paper I will give insight in which ways knowledge about mirror neurons played a role during the making process of The Fifteen Project, and in the empirical research in which I explored kinesthetic experiences of spectators watching The Fifteen Project. Earlier studies has shown that movement experience plays an important role (Calvo-Merino a.o., 2005). My research indicates that also performance characteristics and the way the choreographer and the dancers address the audience may intensify kinesthetic empathy.

Introduction

The title of this paper concerns how performers and spectators are involved in, as Arno Schuitemaker calls it, 'a shared space of action'. The starting point for my collaboration with Arno Schuitemaker was our shared interest in neuroscientific research, and the role Mirror Neurons play since the nineties. Arno was inspired by the discovery of those Mirror Neurons, because it gives us new insights into the relation between action and observation and therefore into the relation between performers and audience.

I am interested in involvement processes of people watching dance performances and especially in *kinesthetic* empathy. I try to get insight in how this process takes place, and the discovery of the Mirror Neurons is of great help to understand some of this process. When I found out that Arno's last work: *The Fifteen Project* was inspired by neuroscientific knowledge, I asked him permission to set up an empirical experiment. I wanted to depart from the research questions I work with. This time to explore (mainly) physical experiences of spectators, in order to relate them to performance characteristics. So *The Fifteen Project* was already touring before my research started.

In this small-scaled empirical research I have focused on manifestations of kinesthetic empathy. I will start with some insights, gained from neuroscientific publications, followed by how knowledge of Mirror Neurons inspired Arno during the making process of *The Fifteen Project.* Next I will explain the research method and present some results of the

exploration of manifestations of kinesthetic empathy, which give rise to further questions and discussion.

Watching Movement

In my research I focus on how people physically react on movements while watching a dance performance. I try to gain more insight into the mechanisms of this, often unconscious, connection between spectator and dancer. The question is how the transformation from watching a movement to feeling the movement takes place, because what happens in the spectator's body is different from the activity of the observed movement.

Brain research reveals more about the way in which our brain processes visual stimuli. In the early nineties, neuroscientist Giacomo Rizzolatti and his research team at the University of Parma in Italy managed to register certain cell activities in the brains of monkeys who were making grabbing movements. They made a spectacular discovery: Accidentally they discovered that the same neurons of the monkeys were active when they *watched* the grabbing movement. This means that not only neurons located in the visual area of the brain, but also neurons located in the motor area of the brain are activated while observing movement.

The discovery of the activity of these mirror neurons, which results in an internal mental transformation, turns out to have implications for our understanding of the behaviour of others. The activation of mirror neurons puts the observer in the same internal state as when the action in question is carried out. These mirror neurons (so called because for these neurons *seeing* is the same as *doing*) form a system to match observation and execution of motor actions.

In the Social Brain Lab, a research centre in the Netherlands, supervised by neuropsychologist Christian Keysers, they discovered that people born without arms watching someone picking up a glass with his or her hand, neurons lit up in those brain areas which have to do with *their* way of picking things up, namely with their feet. People with hands activate areas which specifically control the hand, whereas people without hands show motor representations of the acts they perform with their feet (Gazzola e.o., 2007). These research results show that the mirroring in the brain is a subjective interpretation of someone else's acts, in terms of your own personal motor programme.

Hidden and visible manifestations

Vittorio Gallese, also a member of the University of Parma research team, states that we have a brake system, presumably located in the frontal cortex, that makes that we do not execute observed gestures. So we have the urge to imitate, but we don't. We know that because people who have brain damage in this area cannot stop imitating, even if they are ordered to. Rizzolatti states that the brake system can also 'leak' in the case of people who do not have such brain damage. This results in action, against the observer's will (Noorderlicht VPRO, Mai 23, 2002).

If we apply these research results to the situation in the theatre where during a dance

performance the spectator focuses on the movements of the dancers, then the premotor brain area will show activity related to the observed movements. It is conceivable that the repression mechanism of some spectators may show leaks.

For my PhD research (Wildschut 2003) I asked forty dance experts: choreographers, dancers, dance teachers and dance critics about their experiences with kinesthetic empathy. Their answers showed that this mostly is felt as an inner experience, but also can be visible from the outside. Many answers show that visible movement is restrained and has a kind of 'overflow' in the farthest limbs. This is in line with the brake system as discussed by Rizzolatti. The experts urge to move is channelled in a direction acceptable for that moment, for instance by moving a hand or a head.

The Fifteen Project

In my studies until now I mainly focus on qualitative and quantitative research, using questionnaires in the theatre setting. The research carried out among spectators of *The Fifteen Project*, choreographed by Arno Schuitemaker, gave me the opportunity to explore further and add new findings to results of earlier research, which I carried out among children and experts and among students sitting close by or further away, which was the topic of my presentation in Odense, two years ago. Before explaining the method I used, I will give insight in Arno's way of working, inspired by the knowledge of Mirror Neurons.

By accident, Arno's eye fell on a book of Marco Iacoboni (2008): *Mirroring People. The New Science of how we connect with others*, followed by another one: *Mirrors in the brain. How our Minds share Actions and Emotions*, written by Giacomo Rizzolatti and Corrado Sinigaglia (2008). These books became a source of inspiration to explore the relation between dancers and spectators as a 'shared space of action', so called by Rizzolatti and which means that when we mirror someone else's action, we share this action in a joint space. Arno added a 'shared space of time' to stress the here-and-now. In order to do that he developed for example a very complex 'fingerduet' that keeps speeding up and constantly varies on itself.

The performance started with the audience on the floor, together with the dancers, in order to link action and observation: they watch and move, looking at becomes being part of. Later on, when the spectators are seated in a square, the interchange between audience and performers is expressed the other way round: sometimes one or more dancers take place in between the audience. And halfway the performance some spectators are challenged to literally mirror movements of the dancers.

I selected four episodes to ask questions about, immediately after the performance, which you can watch at http://www.arnoschuitemaker.com/choreographies/#
The first fragment is an off-balance duet, with spectators standing close by. Next the duet with the fingers, followed by one dancer in the air, supported by the other dancers and in the last episode you see a unisono part with all five dancers. In the performance the supporting part comes before the unison part.

As we all know, while watching a dance performance, the audience receives an amount of information. Although the dance itself is usually a domineering aspect, the spectators determine for a large part where to focus their attention and if they want to be involved in

an empathic, experiencing way or an understanding, rational way at certain moments during the performance.

As an outcome of my PhD study I found that in kinesthetic empathy the attention for, or maybe even concentration on, the movement plays an important role. Concentration on the movement can be caused by the interest of the spectator, for instance because of his or her own experience with dance. But it can also be caused by the choreographer who draws the attention to the movement and addresses the body of the spectator, which was often the case in *The Fifteen Project*.

As part of my search for getting more information about and more insight into the involvement process of kinesthetic empathy, I decided this time to explore kinesthetic experiences of spectators in relation to performance characteristics.

The questionnaire

The research experiment took place twice, immediately after the performance. The setting was very suitable, because in the final part the audience was seated on chairs in a square, with the performers in the middle. One of them asked the spectators to stay for a while and fill out a questionnaire.

For each selected scene I asked eight statements about possible involvement strategies, only the last one about physical experiences. They answered these eight statements for each scene without knowing that my focus was on their *physical* experiences. All statements were answered on a five-point scale: from not at all to very strong. The episode with the strongest physical experience was chosen and with this scène in mind, more statements were answered:

8 statements about involvement strategies scene 1
8 statements about involvement strategies scene 2
8 statements about involvement strategies scene 3
8 statements about involvement strategies scene 4

Selected scène
23 statements about what evoked the physical reaction
6 statements about external visible manifestations
9 statements about external visible movements of body parts
6 statements about inner felt manifestations
9 statements about inner felt movements of body parts
1 question about what the physical experience evoked
1 open question about a strong moment
9 short questions about audience characteristics

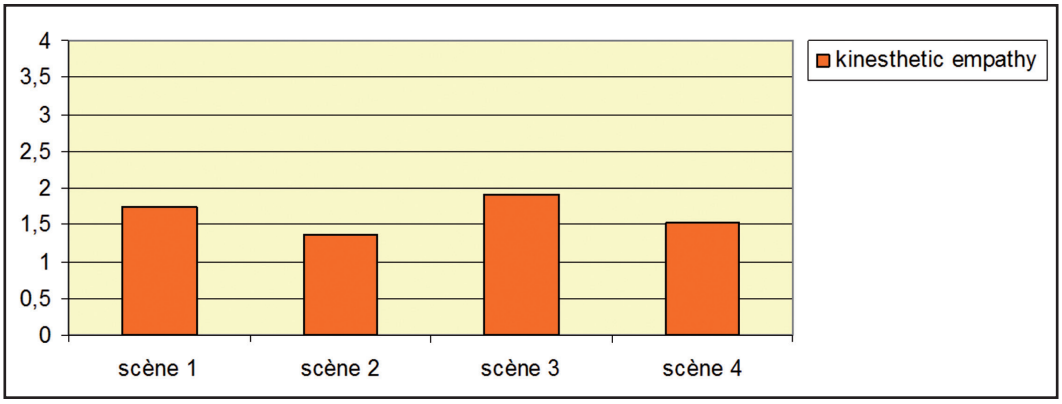
The group consisted of 17 men and 29 women, average age 31. It is important to keep in mind that the answers are the respondents's memories of the awareness of their physical experiences.

The results

My first question was: Are there differences in the awareness of kinesthetic empathy while watching the four selected scenes? In other words: do different movement characteristics evoke a stronger or weaker sense of kinesthetic empathy?

Diagram 1 represents the mean intensity of kinesthetic empathy felt in each scene. 0 stands for 'not at all' and 4 means a very strong physical experience.

Diagram 1: Kinesthetic empathy

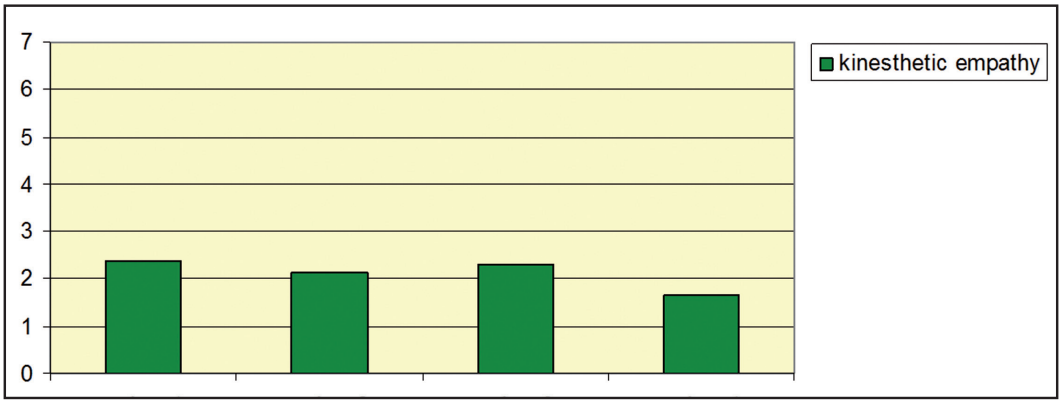


Significant differences:
Between scène 2 and 3: p=.01**
Between scène 3 and 4: p=.05*
Between scène 1 and 2: p=.078 (trend)

Here we see that there is a strong significant difference found in the mean score of kinesthetic empathy between scene 2 and 3, a significant difference between scene 3 and 4 and a tendency between scene 1 and 2. The mean score is nearly 2, which means 'rather strong'. It is fluctuating between 1.37 in the second scene and 1.91 in the third.

I was pleasantly surprised by this result. In another study with the same statements about involvement strategies measured in four scenes, I found a lower intensity, as you can see in Diagram 2.

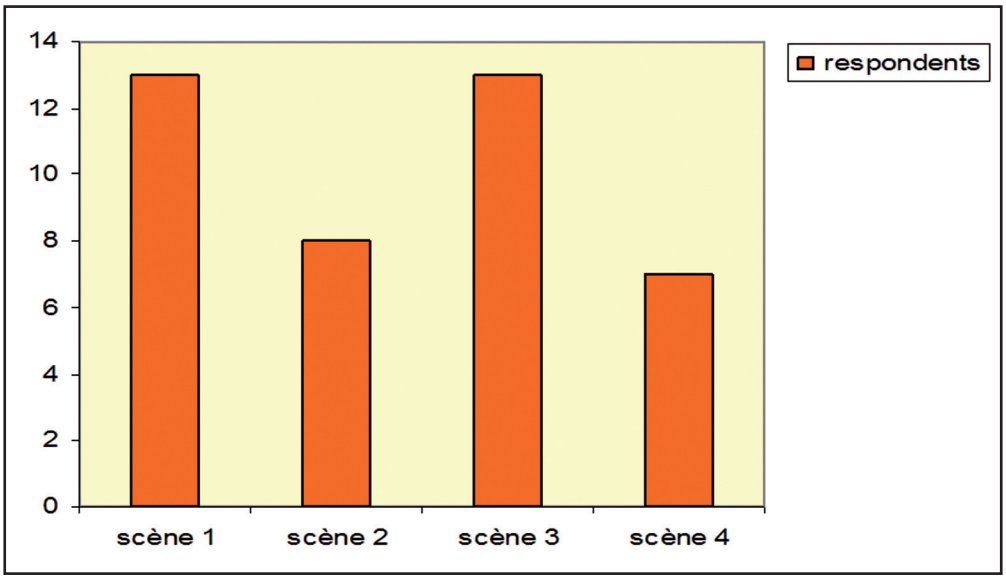
Diagram 2: Kinesthetic empathy Landscape



It is impossible to test if the differences between the two performances are significant, because I used other scales, but if you compare the means, then you can see that in case of the performance *Landscape*, choreographed by Amy Raymond, in between 'not at all' (0) and 'very strong' (7) is 3,5 and that point is not reached. So we may presume that there is a difference in the mean intensity in kinesthetic empathy between the two performances. The way of addressing the spectators by the movements of the dancers during the four studied scenes in *The Fifteen Project* evoked more intense kinesthetic experiences than happened in *Landscape*, but there is no statistic evidence available.

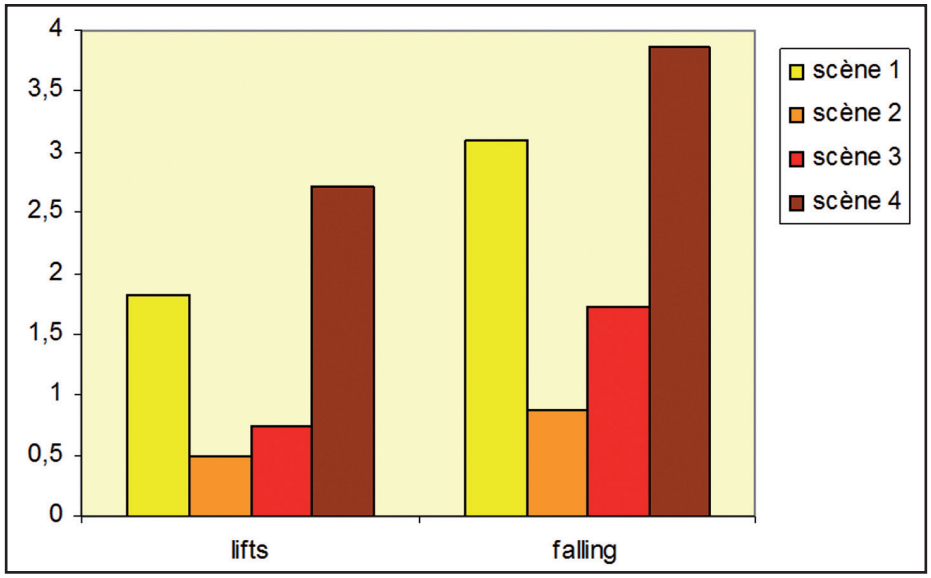
I asked people to answer further questions with only the episode in mind with their highest score, and continue with that specific scène in mind. In Diagram 3 you can see that 13 respondents answered statements related to scene 1 and scene 3, 8 spectators continued with the second episode and 7 with the fourth.5 respondents fell out, because they were not kinesthetically involved or did not remember.

Diagram 3: Respondents



When we take a closer look at kinesthetic empathy as a reaction to movement characteristics we see that these reactions vary in each episode. As an example we can look at lifts and falling movements in Diagram 4:

Diagram 4: Movement characteristics

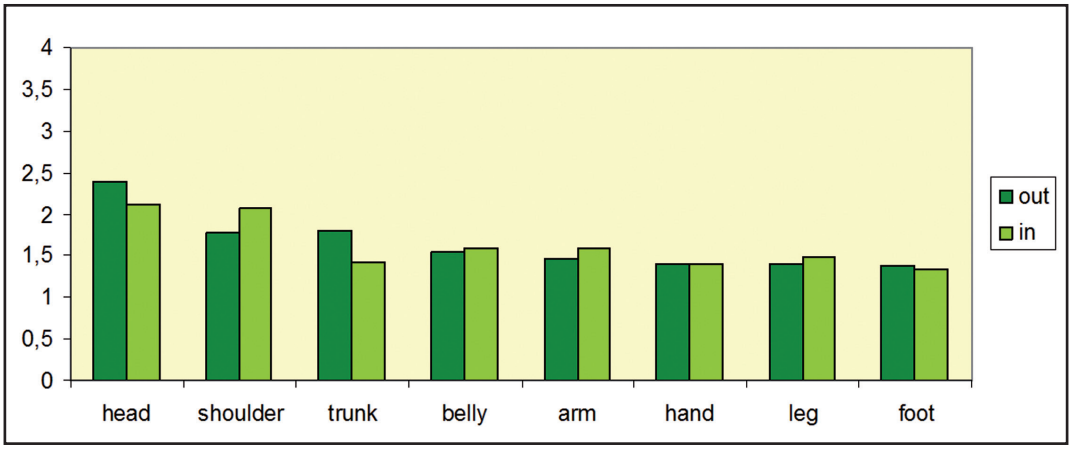


Here we see that extremely strong reactions on falling movements are felt during the fourth episode, where one dancer was lifted by the others, and also in the first scene, the off-balance duet. More or less the same pattern we recognize for lifting movements. This is interesting, because the fourth episode is, according to Arno Schuitemaker, a further development of what was seen in the first episode.

Let us look at another research question: Which parts of the body are involved? I asked the respondents in which parts of their bodies the movements manifested themselves.

We suppose that these physical experiences are mostly invisible, but inner felt. According to Rizzolatti our brake system can leak and this results in action, against the observer's will. Therefore I asked for inner felt as well as external visible movements. In Diagram 5 can see the results:

Diagram 5: Visible and inner felt manifestations



Shoulder: p= .083

Statistic analysis showed no significant differences between visible and inner felt movements. Only in the shoulder I found a marginal difference: a tendency that the inner felt movement is stronger then the outer visible movement of the shoulder. This is not what I expected, based on my study with experts, where they were asked to talk about their experiences. Also the brake system, mentioned by Rizzolatti, supposes a stronger inner felt moving than a visible one.

Conclusions

I finish with some thoughts about the findings presented above:

The four studied scenes evoked more intense kinesthetic experiences than happened in Landscape, but there is no statistic evidence available. *One of Schuitemaker's aims with The Fifteen Project* was to create a shared space of action between performer and spectator, which is supported by this result. It is plausible that the way of addressing the spectators invited them to move along with the movements of the dancers.

I found differences between the scenes in the degree of kinesthetic empathy. A stronger or weaker sense of kinesthetic empathy could be related to different movement characteristics.

The presupposition that kinesthetic empathy is mainly an inner felt sensation is not supported in this study. A possible explanation of this result can be found in the setting of the performance: in the beginning the spectators don't have a seat. They can walk and turn around if they like, and later on some spectators are invited to mirror the performers. It is plausible that, during the performance, this prompted the respondents to show leaks in the brake system, as mentioned by Rizzolatti.

I conclude with the notion that we are talking about experiences of spectators they try to remember. It is possible they only think they felt the movements they reported. Therefore, the research I am carrying out at the moment, in collaboration with the Donders Institute for Brain, Cognition and Behaviour, based in Nijmegen, combines questionnaires and brain scans, in order to correlate conscious and unconscious experiences, wich will give us further insights in the process of kinesthetic empathy.

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