

2 Synchronisation – a musical substrate for positive social interaction and empathy

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Empathy

At its full breadth a capacity for empathy is a capacity to notice, to understand, to internalise, to experience and to adequately respond to another's feelings. Whether empathy is unique to humans is not clear (for example, Bartal, Decety, & Mason, 2011; Langford *et al.*, 2006), but it is definitely a prominent human proficiency. Empathy plays an important part in human life from infancy. For example, in its most essential form empathy constitutes an integral part of parent–infant relations (Elicker, Englund, & Sroufe, 1992; Winnicott, 1960). Parents are constantly striving to unravel their child's needs, wishes and moods and to provide support and consolation as well as direction. At the same time, infants are highly aware of their parents' state of mind and feelings and continuously attempt to adjust to them. As the child develops and grows, he or she exhibits a progressively comprehensive capacity for empathy towards other children and adults (Borke, 1971; Knafo *et al.*, 2008; Rieffe, Ketelaar, & Wiefferink, 2010). Ultimately, full-blown human communities and societies rely on empathy to bring people together, to instill a sense of mutual support among individuals, to enable cooperation and collaboration, and to promote overall social progress.

Empathy is thus an innate human capacity, important for proper social interaction, and may have been essential also for establishing the earliest of human societies. Interestingly, the term empathy was coined only in the beginning of the twentieth century, after the German *Einfühlung*, literally 'feeling into' (Wispe, 1986), originally denoting not interpersonal empathy but rather aesthetic empathy (for a more comprehensive discussion of empathy, see Laurence, this volume). The notion of aesthetic empathy was developed to describe the cognitive and emotional processes characterising aesthetic experience, which consists of a person's projection into nature or a work of art and their perception of the emotions embedded in them. Although interpersonal and aesthetic empathy seem to be distinct, historically they were almost interchangeable. Feeling into another person was likened, if not equated, to an aesthetic experience (Greiner, 2012). But even from a contemporary perspective, it is easy to find similarities between empathy towards another person and empathy or emotional perception of a work of art. A particularly good example for unravelling these links is music, one of the most interactive and emotionally abounding forms of art.

Music and empathy

Music is a rather general term that can mean several different things. Here, music is considered as a form of interaction. Even just listening to music (intently) is an active engagement. The listener experiences the music in his or her own personal way attributing to it meaning, communicating with it, and even guiding it. In fact, it is quite difficult to listen to appealing music without moving, joining in, or occasionally becoming a pretend conductor (Repp, 2002). Listening to music together with other people may further enhance the interaction. It establishes an additional subtle connection among listeners based on the shared experience that they undergo together and on the agreement in taste and enjoyment that they discover. This is even more pronounced in live music performances, in which audience and performers interact and augment each other's experience. Ultimately, playing music together is a full-scale, rich and dynamic interaction whereby participants become highly tuned to one another in an all-immersing experience.

I have previously described in detail how several of the motor, cognitive and emotional processes that take place during musical interaction and determine the quality and character of the interaction may also underlie the capacity to empathise with another person (Cross, Laurence, & Rabinowitch, 2012; Rabinowitch, Cross, & Burnard, 2013). In the current chapter I focus on one of these: synchronisation. First, I will describe synchrony as a general phenomenon of the human experience, then I will consider how in the long-term synchrony might contribute to the acquisition of specific skills that promote empathy, and how in the short-term synchronous interaction might modulate empathic behaviour. Finally, I will outline a rather speculative hypothesis linking between synchrony and interpersonal empathy through an aestheticist perspective.

Rhythm and synchrony

The structure and composition of music is highly complex. It comprises a manifold of interleaved sounds and beats, harmony and melody. The backbone of all this is rhythm, the temporal arrangement of beats, which determines the direction, the speed and the temperament of the unfolding music. Consequently, a key component of musical interaction is synchronisation, the temporal aligning of action between two or more interacting individuals. In a broader sense, rhythm and synchrony are not unique to music. In fact, they seem to be fundamental features of our entire world. From the recurring seasons of the year, the repeated succession of lunar phases, the cycle of day and night, to the waves of sound, of heat and light, we are surrounded by rhythm. To these rhythms the human body is tightly tuned, sensing them, responding to them, and producing also rhythms of its own, the rhythms of walking, talking, chewing and breathing. In a sense, music reflects this central role of rhythm in our existence, and synchronised musical interaction is rooted in our deep predisposition to respond to rhythm, to align to it and to create new rhythms of our own.

Synchrony and acquired empathy

Long-term habitual participation in musical interaction is expected, like any practice, to improve the quality of the musical interaction itself. If musical interaction and interpersonal empathy are indeed related, then training in musical interaction might also enhance the capacity for interpersonal empathy (Clarke, DeNora, & Vuoskoski, 2015; Cross, Laurence, & Rabinowitch, 2012; Rabinowitch, Cross, & Burnard, 2013). But could one's capacity for empathy be at all modified? On the face of it, since the capacity for empathy depends on individual personality traits (Dymond, 1950, Knafo *et al.*, 2008), which are largely constant, one might expect the capacity for empathy to be fixed (e.g. Meltzoff & Moore, 1997). However, empathy depends also on certain acquired skill sets, abilities and attitudes (Allgood, 1992), rendering the capacity for empathy amenable to change (e.g. Heyes, 2011). I term such long-term learned changes in empathy, 'acquired empathy' (see also Ockelford, this volume, for a consideration of the acquisition of musical skills and musical empathy).

I have previously tested experimentally whether long-term musical interaction might contribute to acquired empathy (Rabinowitch, Cross, & Burnard, 2013). To this end, I conducted a one-year study consisting of weekly sessions of a specially tailored musical group interaction programme for elementary school children. The children's scores on several tasks designed to measure their capacity for empathy showed a clear and significant increase in the music group's capacity for empathy compared to the control groups who participated in a parallel story-telling programme or no programme at all (Rabinowitch, Cross, & Burnard, 2013). These results provide evidence for the overall positive long-term effects of musical group interaction on empathy, presumably attained through skill transfer.

Evidence determining whether specifically training in synchronisation can generalise to acquired empathy is still lacking. However, synchronisation was also one of the key ingredients of the musical group interaction programme (Rabinowitch, Cross, & Burnard, 2013). Some of the tasks presented to the children in the study intended to emphasise synchronisation within the musical interaction. One task, for example, consisted of children taking turns in imitating or matching each other's rhythms when tapping on drums. Another example was a game, in which the group composed a certain rhythmic theme, which everybody played together on different instruments. It is hard to tell what the differential contribution of the synchronisation tasks was towards enhancing participants' capacity for empathy, since the programme also included other components of musical interaction in addition to synchronisation. Thus, the degree to which synchronisation played a prominent role in enhancing participants' capacity for empathy and whether their capacity for synchronisation was enhanced as well will have to be examined more closely in the future. Nevertheless, it is worth noting the striking similarities between interpersonal empathy and synchronisation. Empathy and synchronisation rely on the ability to notice, to understand, to internalise, to experience, to connect with and to adequately respond to another's

feelings or another's rhythm, respectively. These parallels suggest that synchronisation and empathy might involve similar cognitive processes, and are therefore potentially amenable to skill transfer.

Synchronisation and empathy modulation

In addition to lifelong innate empathy and to long-term acquired empathy, certain real-time factors such as context, mood and various physiological variables may transiently alter the extent and quality of one's capacity for empathy (for example, Bal & Veltkamp, 2013). I refer to such short-term effects as 'empathy modulation'. Does synchronisation lead to empathy modulation? A rapidly growing body of studies indicate that even brief sessions of interpersonal synchronisation are sufficient to modulate a host of prosocial-related behaviours and attitudes such as affiliation, collaboration and willingness to help. For a very recent comprehensive survey of this literature refer to (Clarke, DeNora, & Vuoskoski, 2015).

Although none of these studies tested directly whether synchronisation might lead to a short-term modulation of participants' capacity for empathy, the expansive effects of synchronisation on multiple aspects of social and emotional interaction that are closely related to empathy, such as a sense of similarity, closeness and affiliation, and the propensity to collaborate, suggest that empathy itself might also be modulated by synchronisation. A few studies have tried to address this issue somewhat more directly. Valdesolo & DeSteno (2011) showed that synchronous others elicit more compassion and altruistic behaviour than asynchronous others. In addition, it has been shown that in some cases, synchrony may elevate one's inclination to offer help to an interacting partner (Kokal *et al.*, 2011) and that infants as young as 14 months display more helpful behaviours towards an adult who moves in synchrony with them when compared to an adult who moved asynchronously with them (Cirelli, Einarson, & Trainor, 2014). Other studies have demonstrated the relative contribution of synchrony in creating greater affiliation (Hove & Risen, 2009), greater similarity and closeness (Rabinowitch & Knafo-Noam, 2015) as well as enhanced person perception (Macrae *et al.*, 2008) and cooperation (Valdesolo, Ouyang, & DeSteno, 2010; Wiltermuth & Heath, 2009). It will be important to further test the modulatory capacity of synchronisation on empathy.

It is also worth considering potential mechanisms that might underlie empathy modulation by synchronisation. First, when two or more individuals synchronise with each other, their movements become physically aligned. Therefore, if they are to stop actively synchronising, but try and continue the interaction, for example, by executing a joint task together, they will be able to better coordinate their actions in space, but most importantly, they will probably be able to form better eye contact and physical rapport with each other following synchrony, which may in turn lead to enhanced positive social interaction and possibly empathy. Second, Cohen *et al.* (2010) showed that there is possibly higher secretion of endorphins following extensive synchronised activity (such as rowing), which may be related to social bonding (for example, Dunbar, 2010). Third, the coupling

between one's own actions and the perception of another performing a similar action has been suggested to underlie theory of mind and empathy in general (reviewed in Clarke, DeNora, & Vuoskoski, 2015). Synchronisation readily affords such coupling, causing us to embody and internalise a person that is synchronised with us, and regard that person as if from a first-person perspective, facilitating empathy towards that person (see, for example, Decety & Jackson, 2006; Jackson, Meltzoff, & Decety, 2005).

Synchronised intensive interactions such as musical interaction might even go beyond empathy. Although empathy consists of stepping into another's shoes, the interpersonal boundary is never broken. In contrast, 'merged subjectivity' (for a detailed account see Rabinowitch, Cross, & Burnard, 2012) comprises a hypothetical condition whereby individuals playing music together might at some point lose track of who is playing what, as their individual subjectivities merge into one (for a detailed account see Rabinowitch, Cross, & Burnard, 2012, as well as Clarke, DeNora, & Vuoskoski, 2015).

Interpersonal synchronisation as a form of aesthetic empathy

To conclude, I wish to entertain an alternative and speculative idea about synchronisation and interpersonal empathy. This entails some reconsideration of the obsolete concept of *Einführung* and the resemblance between interpersonal and aesthetic empathy. A key question that the notion of aesthetic empathy raises is, 'why would anyone imbue a lifeless object, such as music, with emotions?' We can clearly distinguish between live emotional human beings and other entities in the world, including other animals, plants, natural objects, artefacts and works of art. A strong basis for this distinction is provided by theory of mind, the realisation that another person has a mental life comprising intentions, desires, knowledge and emotions (Baron-Cohen, Leslie, & Frith, 1985). Despite this ability, we readily anthropomorphise non-human animals and objects. We ascribe them with human-like characteristics, including emotions, thoughts and intentions. For certain animals, this might be adequate, but less so for physical objects such as cars, clouds or paintings. The term anthropomorphisation itself assumes implicitly that attributing human qualities, such as emotionality to objects is an expansion of theory of mind. First we learn that other people have emotions, and then we imagine that other objects are like other people and therefore may also have emotions.

From this perspective stems a natural inclination to view aesthetic empathy as perhaps an extension of a more fundamental interpersonal empathy. According to this account, humans have a capacity to empathise with other humans, and they use this capacity also when engaging with a work of art. In this sense, they regard the art as if it were another person. Thus, when engaging in music, for example, we notice, understand, internalise and respond to the richness of emotions that we find embedded in the music, in a similar manner to when we empathise with another human. We anthropomorphise music in order to aesthetically empathise with it (Kivy, 1980).

There is no reason, however, to rule out the alternative converse outlook suggested by *Einfühlung*, whereby interpersonal empathy is actually an instance of aesthetic empathy, or that at least the two are closely related (Greiner, 2012). What if generally ascribing emotions to objects outside ourselves, be they other people, or not, precedes theory of mind rather than expands it? It is a valid possibility that before learning to attribute intentions, emotions, and so on to other humans, we initially learn to attribute them to objects in our surroundings. This includes people, but also animals, trees, toys and works of art. Only later do we learn to refine the scope of other-mindedness to humans, singling them out as the true bearers of emotion. According to this account, interpersonal empathy might indeed stem from a more basic aesthetic empathy and not the other way around, or they might be the same altogether. Our capacity to understand, internalise and respond to the emotions of another person may be essentially part of a more fundamental capacity to sense and attribute emotions to objects in general, and in particular to aesthetic objects, such as works of art, which are especially prone to evoke in us emotions.

‘The world is a work of art’ wrote Nietzsche, expressing an aestheticist ontology (Megill, 1987; Nehamas, 1985) that invites us to view everything in the world and every event that takes place as part of an intricate and vibrant enormous work of art. From this perspective, when interacting with another person, one may regard that other person to some extent as an aesthetic object, and perceive emotions in that other person in a similar manner to perceiving emotions in a piece of music, exhibiting an aesthetic empathy towards that person.

Considering that rhythmic synchronisation is a fundamental element of music, then the experience of acting in synchrony with another person may be equivalent to the experience of engaging in music. Furthermore, from an aestheticist perspective, the aesthetic experience of rhythmically synchronising with another person may actually evoke the sensation that that other person is music. This is because, as mentioned above, playing music with another person and playing music alone are similar forms of interaction, both of which are capable of eliciting aesthetic empathy.

Whether or not the world is a work of art is mostly a question of taste and conviction. Whether or not we regard other humans not just functionally but also from an aesthetic perspective, similar to our perception of landscapes and works of art, is an open empirical question deserving attention and consideration. If it is true, then a new and aesthetic link can be drawn between interpersonal synchronisation and empathy.

Conclusions

The concepts of interpersonal and aesthetic empathy share a long and intertwined history. Current work focuses mainly on the interpersonal aspects of empathy. Of particular interest is how interpersonal empathy may be boosted. Synchronisation, a fundamental component of musical interaction is emerging as a powerful enhancer of prosocial attitudes and behaviour. Very scant and indirect

evidence suggests that synchronisation might also have a positive impact on interpersonal empathy through long-term skill transfer and real-time modulation. New experimental data will be necessary to establish this.

References

- Allgood, M. R. (1992). Empathy: The importance of recognizing two types. *Journal of Psychosocial Nursing and Mental Health Services*, 30(3), 14–17.
- Bal, P. M., & Veltkamp, M. (2013). How does fiction reading influence empathy? An experimental investigation on the role of emotional transportation. *PLoS One*, 8(1), e55341.
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a ‘theory of mind’?. *Cognition*, 21(1), 37–46.
- Bartal, I. B. A., Decety, J., & Mason, P. (2011). Empathy and pro-social behavior in rats. *Science*, 334(6061), 1427–1430.
- Borke, H. (1971). Interpersonal perception of young children: Egocentrism or empathy?. *Developmental Psychology*, 5(2), 263–269.
- Cirelli, L. K., Einarson, K. M., & Trainor, L. J. (2014). Interpersonal synchrony increases prosocial behavior in infants. *Developmental Science*, 17(6), 1003–1011.
- Clarke, E., DeNora, T., & Vuoskoski, J. (2015). Music, empathy and cultural understanding. *Physics of Life Reviews*, 15, 61–68.
- Cohen, E., Ejsmond-Frey, R., Knight, N., & Dunbar, R. (2010). Rowers’ high: Elevated endorphin release under conditions of active behavioural synchrony. *Biology Letters*, 6(1), 106–108.
- Cross, I., Laurence, F., & Rabinowitch, T. C. (2012). Empathy and creativity in group musical practices: Towards a concept of empathic creativity. In G. McPherson & G. Welch (Eds.), *The Oxford handbook of music education* (pp. 337–353). Oxford: Oxford University Press.
- Decety, J., & Jackson, P. L. (2006). A social-neuroscience perspective on empathy. *Current Directions in Psychological Science*, 15(2), 54–58.
- Dunbar, R. I. (2010). The social role of touch in humans and primates: Behavioural function and neurobiological mechanisms. *Neuroscience & Biobehavioral Reviews*, 34(2), 260–268.
- Dymond, R. F. (1950). Personality and empathy. *Journal of Consulting Psychology*, 14(5), 343–350.
- Elicker, J., Englund, M., & Sroufe, L. A. (1992). Predicting peer competence and peer relationships in childhood from early parent-child relationships. In M. England & L. A. Sroufe (Eds.), *Family-peer relationships: Modes of linkage* (pp. 77–107). Hillsdale, NJ: Erlbaum.
- Greiner, R. (2012). 1909: The introduction of the word ‘empathy’ into English. *BRANCH: Britain, Representation, and Nineteenth-Century History*, online-only journal.
- Heyes, C. (2011). Automatic imitation. *Psychological bulletin*, 137(3), 463–483.
- Hove, M. J., & Risen, J. L. (2009). It’s all in the timing: Interpersonal synchrony increases affiliation. *Social Cognition*, 27(6), 949–960.
- Jackson, P. L., Meltzoff, A. N., & Decety, J. (2005). How do we perceive the pain of others? A window into the neural processes involved in empathy. *NeuroImage*, 24(3), 771–779.
- Kivy, P. (1980) *The corded shell: Reflections on musical expression*. Princeton, NJ: Princeton University Press.

- Knafo, A., Zahn-Waxler, C., Van Hulle, C., Robinson, J. L., & Rhee, S. H. (2008). The developmental origins of a disposition toward empathy: Genetic and environmental contributions. *Emotion, 8*(6), 737–752.
- Kokal, I., Engel, A., Kirschner, S., & Keysers, C. (2011). Synchronized drumming enhances activity in the caudate and facilitates prosocial commitment – if the rhythm comes easily. *PLoS One, 6*(11), e27272.
- Langford, D. J., Crager, S. E., Shehzad, Z., Smith, S. B., Sotocinal, S. G., Levenstadt, J. S., Chanda, M. L., Levitin, D. J., & Mogil, J. S. (2006). Social modulation of pain as evidence for empathy in mice. *Science, 312*(5782), 1967–1970.
- Macrae, C. N., Duffy, O. K., Miles, L. K., & Lawrence, J. (2008). A case of hand waving: Action synchrony and person perception. *Cognition, 109*(1), 152–156.
- Megill, A. (1987). *Prophets of extremity: Nietzsche, Heidegger, Foucault, Derrida*. Berkeley, CA: University of California Press.
- Meltzoff, A. N., & Moore, M. K. (1997). Explaining facial imitation: A theoretical model. *Early Development and Parenting, 6*, 179–192.
- Nehamas, A. (1985). *Nietzsche: Life as literature*. Boston, MA: Harvard University Press.
- Rabinowitch, T. C., Cross, I., & Burnard, P. (2012). Musical group interaction, intersubjectivity and merged subjectivity. In D. Reynolds & M. Reason (Eds.), *Kinesthetic empathy in creative and cultural practices* (pp. 109–120). Bristol: Intellect.
- Rabinowitch, T. C., Cross, I., & Burnard, P. (2013). Long-term musical group interaction has a positive influence on empathy in children. *Psychology of Music, 41*(4), 484–498.
- Rabinowitch, T. C., & Knafo-Noam, A. (2015). Synchronous rhythmic interaction enhances children's perceived similarity and closeness towards each other. *PLoS One, 10*(4).
- Repp, B. H. (2002). The embodiment of musical structure: Effects of musical context on sensorimotor synchronization with complex timing patterns. In W. Prinz & B. Hommel (Eds.), *Common mechanisms in perception and action: Attention and performance XIX* (pp. 245–265). Oxford: Oxford University Press.
- Rieffe, C., Ketelaar, L., & Wiefferink, C. H. (2010). Assessing empathy in young children: Construction and validation of an Empathy Questionnaire (EmQue). *Personality and Individual Differences, 49*(5), 362–367.
- Valdesolo, P., & DeSteno, D. (2011). Synchrony and the social tuning of compassion. *Emotion, 11*(2), 262–266.
- Valdesolo, P., Ouyang, J., & DeSteno, D. (2010). The rhythm of joint action: Synchrony promotes cooperative ability. *Journal of Experimental Social Psychology, 46*(4), 693–695.
- Wiltermuth, S. S., & Heath, C. (2009). Synchrony and cooperation. *Psychological Science, 20*(1), 1–5.
- Winnicott, D. W. (1960). The theory of the parent-infant relationship. *International Journal of Psychoanalysis, 41*(6), 585–595.
- Wispe, L. (1986) The distinction between sympathy and empathy: To call forth a concept, a word is needed. *Journal of Personality and Social Psychology, 50*(2), 314–321.